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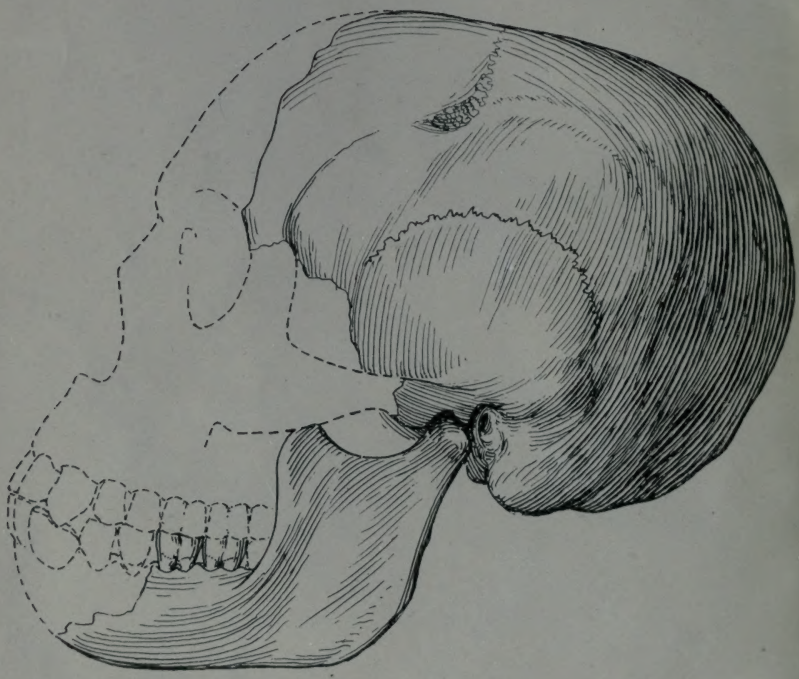

EOANTHROPUS DAWSONI.

Reconstruction of the Piltdown Skull according to Smith Woodward.

The shaded parts of the skull are those actually discovered.

(From Dawson & Woodward in the "Quarterly Journal of the Geological Society," March, 1913. Reproduced by kind permission.)

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MAN AND HIS FORERUNNERS

BY

H. v. BUTTEL-REEPEN
Prof: D. Phil. (Zool.)

Incorporating Accounts of Recent Discoveries in Suffolk and Sussex

AUTHORIZED TRANSLATION

BY

A. G. THACKER
A.R.C.S. (Lond.)

With a frontispiece, 70 figures in the text and 3 tables

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MEASUREMENTS.

2½ centimeters = 1 inch (approximately).

1000 cubic centimeters = 61 cubic inches (approximately).

Cranial capacity (*size of the brain*) *in* :—

Gorilla =	500— 600	cubic centimeters.
Javan Ape-man =	850— 950	" "
Piltdown Skull =	1070	" "
Neandertal Race =	1230—1350 (?)	" "
Modern Europeans =	1450—1550	" "

PREFACE TO THE ENGLISH TRANSLATION.

IN consequence of the frequent discoveries, in recent years, of extremely ancient human remains, great interest in the subject of prehistoric man has been aroused amongst the general public. This little work, in a somewhat different form and provided with a general bibliography, has had a favorable reception in Germany, and Danish and Russian editions are now in preparation. The following free translation into English has been excellently carried out by Mr A. G. THACKER, and I am also indebted to him for valuable assistance in writing the accounts of the latest finds in Suffolk and Sussex. The present book is rather more popular and less technical in style than the German original, and should therefore appeal to an even wider circle of readers; and I hope it will find many friends in the country from which we all received, through the work of Charles Darwin, the first clear light upon the evolution of mankind.

PROF. V. BUTTEL-REEPEN.

OLDENBURG i. GR.,
GERMANY,
March, 1913.

TRANSLATOR'S NOTE.

DR. v. Buttel-Reepen's book, which I have pleasure in introducing to English and American readers, was published in Germany two years ago under the title, "Aus dem Werdegang der Menschheit." The period covered by the work extends from the first traces of a manlike creature to the end of the Glacial Period, that is, to the end of the Early Stone Age in Europe; and hence the following pages are a complete summary of the geological evidence bearing upon the origin of man.

Recent researches have brought out in a striking manner the important fact that in the remote past there existed not one kind of man, but several very distinct kinds, just as there are half-a-dozen diverse sorts of apes living at the present day. Thus in addition to the modern type, four different species are known: the now familiar Neandertal Race; the creatures represented by a single jaw found near Heidelberg; the famous ape-man of Java; and lastly the Piltdown Race, the *Eoanthropus dawsoni*, known from the remarkable skull found at Piltdown Common, in Sussex, the discovery of which was made known to the world at the end of 1912. How far the term "man" is really applicable to all these kindred species, these forerunners of mankind proper, is a moot point, the Javan ape-man in particular being

very unlike ourselves. This verbal difficulty is of course one which, on the theory of gradual evolution, was certain to arise as soon as geologists discovered any of the so-called missing links, and it may become necessary eventually to revise our terminology and restrict the term man to the living species. However that may be, it now seems almost certain that the oldest stone implements antedate by long ages the appearance of any being whom we should have greeted as human if we had met him in the flesh.

It is generally held that all the living varieties of mankind are members of the same species, but there has recently been a resuscitation in a new form of the old controversy concerning the single or multiple origin of modern races, and the theories of one school of the new polygenists, which have gained some currency on the continent, are expounded in Chapter VI.

Following the now universal custom, I have expressed all the measurements of skulls in centimeters, but elsewhere I have adopted the British system of measures, since this is still much more familiar to English readers.

A short list of English books dealing with prehistoric times has been substituted for the mainly German bibliography which was appended to the original work.

My best thanks are due to Dr. Smith Woodward, of the British Museum, who kindly showed me the Sussex specimens at an early date.

A. G. THACKER.

GLOUCESTER,
April, 1913.

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INTRODUCTION.

SINCE the beginning of history man has always shown the greatest interest in his own origin, although until recently the problem has appeared an insoluble enigma. For thousands of years the subject was surrounded by unsubstantial myths, which served only to mislead inquirers and to render more obscure the beginnings of the human race. It is only during the last fifty years, with the proof and general acceptance of the theory of evolution, that the truth has begun to come to light. And even now when we have found a satisfactory answer to this "Question of all questions," the answer can only be given in general terms. The fact of evolution upwards from lower and simpler forms of life is indeed no longer disputed. But the exact course of the upward march through the hundreds of thousands, nay millions, of years that lie behind us, is still shrouded in darkness. Here and there parts of the road we have travelled are lit up by recent discoveries, a few furlongs can be seen here perhaps quite close to us, and there in the far distance. But most is hidden, and the connexion between the few visible spots, in other words, the complete course of the road, can only be filled in by our own imagination ; and that when we are endeavoring to describe the whole story we are relating what is largely hypothesis, is a fact that cannot be too often reiterated.

In the following pages I have attempted to describe the main lines of human descent, but in doing so it has not been necessary or possible to give all the evidence. Many important discoveries bearing upon the problem are merely mentioned, and many are altogether ignored. For instance, I have not described the wonderful light which is thrown upon man's origin by the science of embryology, nor have I referred to the thousands of interesting and pertinent facts that may be adduced from the evolution of animal and vegetable life in general. The paleontological and geological discoveries with which I deal are, however, sufficient to give an accurate if general idea of the manner in which man has come to be what he is. It must be remembered, as already stated, that the details are far from certain. Thus it will be seen that it is often impossible to speak with confidence about this or that phase in the progress of primitive man, and the opinions of experts on the various discoveries are frequently contradictory. But whilst I have mentioned the views of well-known scholars on many of the debatable points, I have also stated my own opinion clearly and definitely, since otherwise it would have been impossible to give an intelligible summary of the story. I have entered somewhat fully into the geological conditions which prevailed during the different periods, for only so can a true picture be given of the surroundings in which our ancestors found themselves or of the manner of life that they led.

CHAPTER I.

THE EARLIEST TRACES OF MAN.

A GREAT deal of work was done by the earlier scholars in searching for relics of primitive man, but for a long time no clear light was thrown upon his history. The earlier researches found him essentially what he is now. But in 1856 the classic discovery was made. In that year a skull was found in the valley, called the Neandertal*, between Düsseldorf and Elberfeld in Germany, which was of a remarkable type, and at that time quite unique. This is the famous "Neandertal skull," which was discovered by Fuhlrott, and has given its name to a race, or species of men, who lived in Europe during the Glacial Period (the "Great Ice Age"), and were in many respects very different from ourselves. The skull was found in a cave in the Devonian Limestone, which is situated at this spot and lay, among other human bones, in a layer of Glacial clay some seven feet thick.

The most noticeable peculiarities of the skull (Fig. 1) are the thickness of the bones, the low retreating forehead, the heavy brow-ridges, and the widening of the skull towards the hind end. All these are primitive characters. The cubic capacity of the brain-case is very small, although the actual size of the skull is considerable. The capacity is

* Tal. (Ger.): Valley (Eng.)

about 1,230 cubic centimeters, as compared with a capacity of about 1,550 ccm. in modern European skulls of the same size.*

Fig. 1.—The skull discovered in the Neandertal. Viewed from the side.

(After Schwalbe from Leche†).

A short time after this skull was discovered, the bones and teeth of the cave-bear, the cave-hyena, and an extinct rhinoceros were found in the same stratum and quite close to the skull.

All these animals are now of course extinct. They lived during what is called the Pleistocene or Glacial Period, the age in the earth's history immediately preceding that in which we ourselves live. The presence of these remains near the skull therefore pointed clearly to an extremely ancient date for the latter; there is, however, no absolute proof of the

* This small cranial capacity of 1,230 cubic centimeters is not found in all representatives of the Neandertal Race, as we shall see later in discussing other skulls.

† My best thanks are due to Prof. Leche for permission to reproduce this and other figures.—AUTHOR.

exact age of the stratum, and there might be some doubt as to the antiquity of this Neandertal skull, were it not that very similar skulls have since been found at Spy, Krapina, Le Moustier, La Chapelle-aux-Saints and other localities in strata that are unquestionably of Pleistocene age. These later discoveries are sufficient to convince the most critical that the Neandertal Race, the *Homo neandertalensis* of Fuhlrott, really lived during the Glacial Period.

Fig. 2 illustrates a reconstruction of the skull of Neandertal man, and shows well the peculiar forehead and other features.

Fig. 2.—Theoretical reconstruction of the entire Neandertal skull.
(After Klaatsch from Leche).

Now in order to realize fully the exact place in the earth's history held by this Glacial Period with which we are so much concerned it is necessary to take a general survey of the earth's history as a whole. The story of life upon the Globe is contained in what are called the stratified rocks. Sediment is always falling to the bottom of the ocean and other expanses of water, and this sediment becomes formed into layers or "strata," the newer layers being above the older layers; and with the sediment the remains of animals and plants fall to the bottom and form fossils. It is in this way, by means of mechanical or chemical deposition in water, that nearly all the stratified rocks were formed, and it is with these rocks and their contents that "historical" geology deals. But any estimate of the almost unlimited time necessary for the formation of the various strata is decidedly precarious. The matter is certainly not within the sphere of exact science. Thus the estimates which have been formed of the time that has elapsed since the beginning of organic life upon the earth vary from twenty-five million years to one thousand four hundred millions, and more, a divergence of opinion which speaks for itself! Nevertheless, it is the case, as Hæckel very truly remarks, that "it is of the greatest importance for a full comprehension of the history of evolution, and particularly of that of mankind, to obtain a clear idea of the enormous length of time during which the gradual development of organic life upon our planet has been taking place."

Many geologists are now of opinion that the smallest estimate of that time which can be accepted is a hundred million years, and it is upon the basis of this computation that Table I. is constructed.

Table I.—Theoretical Section through the Earth's Crust.

	Names of the Strata	Approximate Thickness of Strata	Duration o the Periods (Minimum estimate in years)
Cainozoic — Quaternary	**Recent**		
	Pleistocene (Glacial Period)		
Cainozoic — Tertiary	**Pliocene**	3,000 feet	3 Million
	Miocene		
	Oligocene		
	Eocene		
	Paleocene		
Secondary (or Mesozoic)	**Cretaceous**	10,000 feet	11 Million
	Jurassic		
	Triassic		
Primary (or Paleozoic)	**Permian**	50,000 feet	34 Million
	Carboniferous (containing Coal Measures)		
	Devonian		
	Silurian		
	Cambrian		
Archeozoic	**Precambrian**	100,000 feet	52 Million

The computation of the length of time which each particular stratum required to be formed is founded upon the approximate thickness of that stratum. But here too the data are very uncertain, particularly in the case of the earlier sedimentary rocks. However, Penck, who is a well-known specialist on the Glacial Period in the region of the Alps, has come to fairly reliable conclusions on the duration of the later periods. He has been able to estimate the length of

certain Tertiary epochs, and the duration of the warm phases of the Pleistocene, which are known as the "Inter-glacial Periods." His estimates are embodied in the two subsequent tables.

As is well known, the strata of the earth's crust do not in reality lie under one another in the horizontal position, as they may be supposed to do in a theoretical section. They have been in most cases much distorted out of this original position by earth-movements. Very often we find them projecting up almost vertically, or forced through each other. Hence it often occurs that deep-lying strata crop out at the surface, and for the most part it is only through this distortion of the rocks that we are able to learn anything of the earth's crust. (See Fig. 3).

Fig. 3. – Strata projecting at the surface of the ground in an almost vertical position. The locality illustrated is near Camataqui in Bolivia.

(From "Weltall und Menschheit.")

Since we are dealing here with the history of mankind, it is of course the latest strata—the last part of the Tertiary and the Quaternary formations—with which we are mainly concerned.

The question which it is natural first to ask is, in which of these strata do the earliest traces of man appear? At present we know of no certain relics of man, or let us say of a tool-making forerunner of man, from the lower Tertiary strata. No implements have been found in the Paleocene, or in the Eocene; nor are any certainly known from the Oligocene. But flint implements of rough workmanship have been discovered in the Middle Tertiary, in the Upper Miocene. These implements have been given the name of eoliths, and they are to be regarded as the first traces of primitive man.

It is true, however, that the genuineness of these eoliths is still disputed. Some authorities still believe that they are flints which bear merely an accidental resemblance to implements, and it must be admitted that among the numberless specimens that are reputed to be eoliths, there are certainly some which were never in the hands of primitive man. Expert opinion, however, is gradually coming round to the view that the eoliths are really of human manufacture. Scholars like Verworn and Rutot, who have made a thorough study of flint, believe that many of these alleged implements are genuine.

And moreover since flints of better workmanship are found in the upper Pliocene and lower Pleistocene strata, it would seem an inevitable inference that there must have been a time when rougher implements were alone made. We are compelled to assume that man passed through some

early stage resembling that which the eoliths seem to show us. And we must remember that fifty years ago there were great disputes about the existence of

Table II.—The Stages of Prehistoric Culture.

Quaternary Era	**Recent Period**	About 300 B.C. to 100 A.D.	**Later Iron Age** (La Tène Culture).
		From about 1000 B.C.	**Early Iron Age** (Hallstadt Culture).
		From about 2500 B.C.	**Bronze Age.**
		From about 3000 B.C.	**Copper Age.**
		Lasted about 15,000—25,000 years	**Neolithic Age.** (Later Stone Age). Polished Stone Implements. First appearance of Ceramics.
	Pleistocene (Glacial Period)	According to Penck lasted $\frac{1}{3}$—$1\frac{1}{2}$ million years	**Paleolithic Age.** (Early Stone Age). Stone implements chipped with some skill. First appearance of Art,—Drawing and Sculpture.
Tertiary Era	**Pliocene**	According to Penck lasted about 2 million years	**Icenian Paleoliths** (Rostro-carinate implements)
			Prestian / **Kentian** — **Eolithic Age** (Very rough stone implements)
	Miocene	According to Penck lasted about 3 million years	**Cantalian** — **Eolithic Age** (Very rough stone implements)
	Oligocene	...	Possibly unworked stones were used as implements. (Pre-eoliths) ?
	Eocene		
	Paleocene		

Glacial man, and about the presence of prehistoric relics in Egypt. These controversies appear very strange to us now, and probably a few years hence the doubts which are entertained about the genuineness of eolithic relics will seem equally remarkable.

As long ago as 1867 the Abbé Bourgeois discovered flints, which he supposed to have been worked by early man, in the freshwater strata of the Upper Oligocene. But neither he nor later investigators gained any credence, for at that time it was an unheard-of thing to suggest that man existed in Tertiary times—the existence even of Glacial man being in doubt. Much more recently "eoliths" have been discovered in the Oligocene strata of Belgium, and by some experts are believed to be genuine. But Verworn, the authority previously mentioned, believes these to be natural flints, and after a personal examination of the specimens I can only agree with his opinion. So far as is at present known, therefore, the Upper Miocene is the oldest geological stratum in which undoubted eoliths have been found.

In Fig. 4 an excellent example of an eolith is illustrated on a large scale; *a* is drawn from the upper surface, *b* from the lower, and *c* from the side. This specimen was discovered by Verworn in the Upper Miocene, near Aurillac, in France, and there can be no question of its artificial character. For marks of chipping are clearly to be seen near the edge of the stone. And the regular manner in which the little pieces have been chipped off is convincing evidence of design.

There is other evidence of a somewhat different kind that primitive man first used implements of the eolithic type. For implements of this kind among others were used by the Tasmanian aborigines, a luckless people who were exterminated by the

colonists during the last century, and eoliths are still found in the old camps of these very primitive natives.*

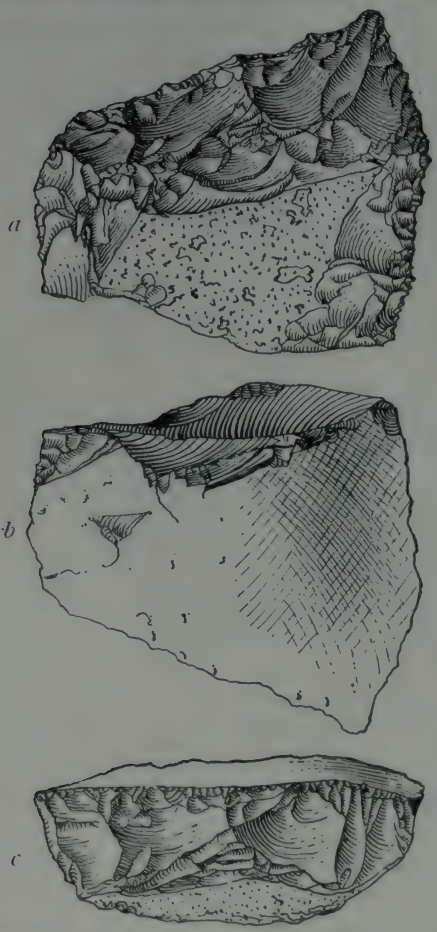


Fig. 4.—Roughly worked flint, or "eolith." Found in the Hipparion-bed of the Upper Miocene, at Aurillac, in France. ("Cantalian" implement). Drawn to the actual size. (After Verworn†)

* It is possible that even paleolithic implements date back as far as the Upper Miocene. According to Sir Ray Lankester a few implements, closely resembling the earliest type of paleoliths, are known to have been discovered among the eoliths at Aurillac. (See page 31).

† My best thanks are due to Prof. Verwern for permission to reproduce this and other figures.—AUTHOR.

CHAPTER II.

MAN BEFORE THE ICE AGE.

WE have seen in the last chapter that the first relics of man, or of a tool-making animal allied to him, are found in the later Tertiary deposits, dating from the far distant times before the great ice-sheets changed the face of the northern hemisphere. Let us picture to ourselves the surroundings in which our Preglacial ancestors lived. The climate of Europe in Early Cainozoic times was undoubtedly tropical, or sub-tropical. The remains of palms and other tropical plants are found in the Eocene strata. During the Eocene Period, however, a large part of Europe, and of Asia too, was below the level of the sea. Had there been any ships in those days, they could have sailed from the Atlantic across Spain, France, South Germany, Switzerland, Italy, on across Asia Minor and Persia, over India and Eastern Asia into the Pacific Ocean. The time which has elapsed since the Eocene Period must be truly enormous, for many of the highest mountain ranges were then either completely non-existent, or were comparatively trifling elevations rising out of the great ocean. This is true not only of the Alps, Carpathians, and the mountains of the Caucasus, but also of the Cordilleras, Himalayas and so on. The fact that these mountains have been raised in comparatively recent ages (from the geologists' point of view) is known from the discovery at great elevations

of the fossilized remains of animals which lived in the Eocene sea, the fossils being found of course in rocks which were formed as submarine deposits. Some of the best known of these are the little organisms called nummulites, whose shells compose the widely spread "Nummulite Limestone." These are found at a height of over 11,000 feet in the Alps, and in the Himalayas even up to 16,000 feet.

The process of raising these mountains by movements of the earth's crust must have been exceedingly slow. It probably occupied millions of years. By Miocene times, however, most of the ranges had reached their maximum elevation, though here and there the upward movement seems to have continued into the Pliocene and even into the Pleistocene Period. Meanwhile, of course, dry land was everywhere appearing, the sea was receding, and Europe was shaping itself into something approaching the form we know so well. A considerable part of North Germany, however, still lay below the level of the Miocene sea. Whilst these changes in the distribution of land and water were taking place, the climate also was altering. The conditions were becoming less tropical. Yet there were coral-reefs as far north as Malta, and in Central Europe palms, camphor-laurels, cinnamons, cypresses, magnolias, myrtles, oleanders, olives, etc., flourished during the Oligocene, and persisting into the Miocene, they lived side by side with the deciduous trees and firs which grow there now. In particular, the Swamp-cypress, *Taxodium distichum*, the tree which grows thickly in the great Atlantic forest-swamps of southern North America, was then widely spread in Europe. It is found fossilized in certain lignite deposits. About this time, however, the cycads disappeared from Europe altogether.

The animals which inhabited Europe in Pre-glacial times were no less remarkable than the plants. Great beasts, strangely different from the small creatures which are alone found in Europe now, haunted the forests and swarmed across the plains. There were great trunked-mammals, precursors of our modern elephants. One species of these, *Dinotherium giganteum*, stood 13 or 14 feet high, and another species, one of the mastodons, was a monster bearing four tusks. Rhinoceroses of huge size were also abundant. During Tertiary times, too, our horses were being gradually evolved. The history of their development is exceptionally well known, and the one-toed horse of to-day can be traced back to a queer little ancestor, a five-toed quadruped of the Eocene. This little animal increased in size and began losing its toes, and in the Miocene we find the remains of its descendant, the three-toed Hipparion, in enormous numbers, whence arose the single-hoofed horses of the present day. The woods and caverns were alive with beasts of prey—hyenas, bears, and tigers. One of the most terrible was the sabre-toothed tiger, *Machairodus*, so called because its upper canine teeth were six or seven inches long. Great apes also inhabited Europe in the Miocene, one kind, the *Dryopithecus*, probably being as large as a man.

Such, then, were the surroundings in which the fashioners of the eoliths found themselves: and such were their competitors in the struggle for existence. The tool-makers themselves were no doubt but half-human. At first they were ignorant of fire,* and had

* The first traces of fire are generally believed to occur in the second inter-glacial phase. Rutot believes that the art of making fire was known in the first inter-glacial phase. Other authorities believe that it was discovered as early as the Pliocene Period.

no articulate speech. They needed no clothes, for they were strong, hardy and very hairy, and the climate was still warm. And they roamed the forest in small hordes, armed with wooden clubs, ever ready to defend themselves against the terrible carnivores, with whom they waged a perpetual warfare.

It has been generally held that Tertiary man lived by hunting, but by some authorities this is disputed. It must be remembered that he lived in a warm climate, with an abundant vegetation, and it seems more than probable that his diet was a vegetable one, and that like his prehuman progenitors he ate fruits, roots, nuts and such like. Many millions of natives in the South Seas and elsewhere are even to-day almost pure vegetarians. But when the climate began to cool, as it did in the Pliocene, the edible fruits would have grown fewer and less abundant, and primitive man had perforce to search about for other means of supply. It was then that he may be supposed first to have taken to animal food, and if the use of fire were discovered so early, that would afford a ready method of making his new provisions more appetizing.

Finally, with the onset of the Glacial Period, the possibility of procuring vegetable food would have almost completely vanished, and the primeval savages would have become exclusively carnivorous. It is probable that the extraordinarily powerful and long - or "prognathous"--jaws which are so characteristic of human skulls from the Early Pleistocene strata were developed owing to the extremely tough nature of the food consumed.

It is probable that in many places, though not in all, the precursor of man remained at much the same

level of culture for hundreds of thousands of years. For in the uppermost Tertiary strata eoliths are found in all respects similar to those from the Miocene. A large number of such eoliths are known, for instance, from the "Kent Plateau," and these are of Pliocene age. The climate and vegetation were changing, the sea was still further receding, and the tropical animals were dying out or were seeking more congenial homes further south, but man was struggling upward with painful slowness. And he was still obliged to contend with fearsome enemies; in the Pliocene there was an immense elephant nearly 20 feet high, *Elephas meridionalis*, and an equally formidable monster, a huge rhinoceros, known as *Rhinoceros etruscus*.

Now although we have these quite numerous relics of man's handiwork from the Preglacial strata, the remains of man himself are extremely rare until we reach the Pleistocene Period. Indeed, such are limited to the two discoveries about to be described; and even these go back no further than the Upper Pliocene, and by some even this is held to be too early a date to assign to them. One of these discoveries is well known, and rivals even that of Neandertal in its epoch-making importance. In 1891 and 1892 Dubois, a Dutch army-surgeon, carried out some reseaches in Java which brought to light the remains of a most remarkable being,—a creature which can only be held to be intermediate between man and his prehuman ancestors. It has been styled the "Ape-man of Java", and is known to scientists as *Pithecanthropus erectus*. The remains were found by Dubois in the banks of the Bengawan or Solo River, where it flows across the plain of Madiun; the fossilized fragments were discovered in a cliff

on the left or east bank of the river, opposite the village of Trinil—hence this is often referred to as the Trinil discovery. The exact remains disclosed were :—the roof of a skull, and a cheek-tooth in 1891; a thigh bone (or "femur") and a second cheek-tooth in 1892, and later on Dubois found a third tooth (a pre-molar) and a fragment of a lower-jaw, but no description of these has yet appeared.

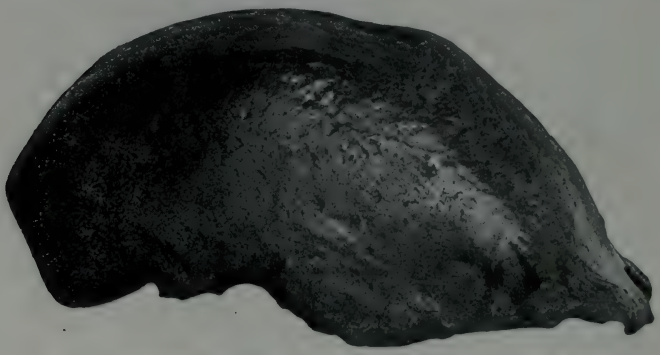


Fig. 5.—Skull of the Javan Ape-man, *Pithecanthropus erectus*. (After Dubois).

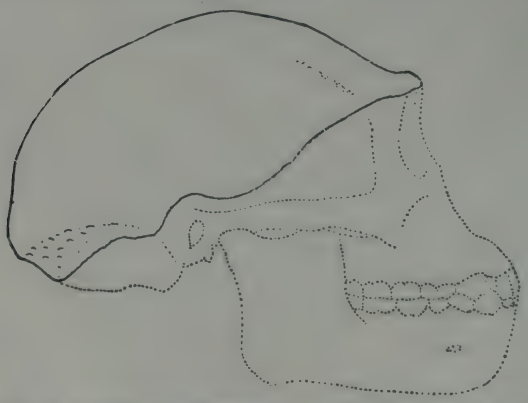


Fig. 6. — Theoretical reconstruction of the entire skull of the Javan Ape-man. (After Dubois).

The skull is shown from the side in Fig. 5 and in Fig. 6 is seen a hypothetical reconstruction of the whole skull, which is probably fairly accurate. The extremely low forehead and other primitive features which were noticed in the Neandertal skull are present again in this cranium, but here are even more pronounced. The capacity of the brain-case is only about 850 ccm. — only about three fifths that of a modern European.

There have naturally been numerous discussions as to the relationship of this animal to mankind, though unfortunately it is not possible to weigh all the pros and cons very fully here. Certainly an examination of the skull and all its significant characters can only leave one with the impression that we are dealing with an intermediate form, a veritable link in the chain of human ancestry. And if, starting with the strange men who inhabited Europe during the early part of the Glacial Period, we were to attempt to reason backwards and to construct for ourselves the likeness of their Tertiary forerunners, we could scarcely miss out a phase which is presented to us more or less exactly by *Pithecanthropus*. Whether, however, this ape-man is in the direct line of ancestry seems doubtful, though by no means impossible, for the thigh-bone is large and thoroughly human, and proves that its possessor stood about 5 ft. 6 ins. high and walked upright.

It is probable for other reasons that the legs were the first part of the body to become human in form; because even for mechanical reasons it was only after the erect carriage had been assumed that the increase in the size of the brain-case and brain could come about.

As already stated, Dubois himself and other authorities hold that the stratum in which the discovery was made is to be referred to the uppermost Pliocene. And an enormous number of animal remains that were unearthed along with the ape-man (400 boxes of which were brought home) seem to be of a Pliocene character. There is, however, a difference of opinion on the question, some scholars holding that the bed is of early Pleistocene date; and it may be that no really satisfactory conclusion will ever be arrived at, for the bones are not in the place where they were originally deposited,—the femur indeed lay 45 feet away from the skull. But after all it is of little importance whether the animal in question lived at the very end of the Pliocene, or at the very beginning of the Pleistocene.

What is really the relationship of this creature to humanity is still a point of acute controversy. And only recently the question has been yet further complicated, for about two miles from Trinil a genuine (though primitive) human tooth has been discovered which is thought from its state of preservation to be even older than the *Pithecanthropus*. Are we to believe, then, that real man lived in Java at the same time as this strange ape-like being?

The second discovery of human remains in a stratum which may be as old as the Pliocene was made nearer home. In 1907 an immense and extraordinary human jaw was discovered near the village of Mauer, not far from Heidelberg, in Germany. The jaw was buried about 80 feet below the surface in a layer of sand and shingle, above which was a layer of clay, then another of sandy-gravel, whilst on the top there was a bed of the peculiar clay known as "Loess," a

stratum of late Pleistocene age of which I shall have more to say presently.

The great depth at which the jaw was situated pointed to a remarkable antiquity, and in the same stratum with it — a stratum which if not actually Pliocene is probably at the bottom of the Glacial series—there were found amongst other remains the bones of an ancient elephant, *Elephas antiquus*, which was a forerunner of the mammoth and the existing species. The jaw (Fig. 7) was excellently

Fig. 7 — Lower-jaw discovered near Heidelberg. *Homo heidelbergensis.*
(After Schoetensack).

preserved, and apart from its size it is remarkable for the complete absence of a chin. This is a very primitive feature, since the presence of a chin in modern man is to be regarded as having come about by the contraction of the upper surfaces of the jaw, owing to less room being required for the teeth as

man became more civilized. (Fig. 8). As compared with the size of the jaw, however, the teeth are surprisingly small, for although they exceed those of modern Europeans, Australian aborigines sometimes possess larger teeth. This seems somewhat of a paradox, but the character of the teeth makes it clear that the jaw really belonged to a man. Among existing races the Eskimos have very large jaws, often surpassing those of Glacial men, but they never approach the Mauer mandible in this respect. As

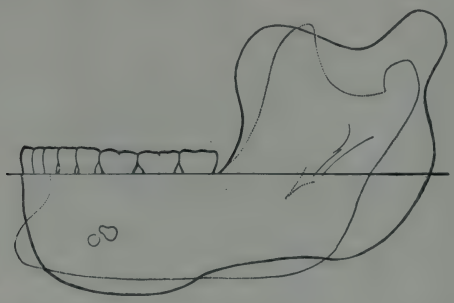


Fig. 8.—Outline of the Heidelberg jaw compared with that of the jaw of a modern European; the fine line represents the modern jaw.

(After Schoetensack).

regards the age of this specimen we find once more that there is a divergence of opinion among experts. The sands round Mauer were deposited by an old arm of the river Neckar, and consist therefore of material that has been washed together from various quarters. In Table III, I have placed the owner of the jaw, who was given the name *Homo heidelbergensis* by the discoverer, Schoetensack, at the very beginning of the Glacial Period, but it is quite possible that he really belongs higher up in the series. However,

be this as it may, the specimen is of transcendent interest. For the characters of the jaw are pre-neandertaloid,—it is at a stage earlier than that of the Neandertal Race—and though connected closely with that race, it is a distinct step downwards into the darkness which at present shrouds our Tertiary forbears.

CHAPTER III.

THE GLACIAL PERIOD AND THE EARLY STONE AGE.

AT the beginning of the Pleistocene primitive man entered upon a trying stage in his history. Although the average temperature in Glacial times was probably not many degrees lower than that of to-day, yet the climate became much less congenial, much more snowy and rainy. In many places the snow no longer melted in the valleys, the glaciers slowly but surely pushed out further into the plains, and finally enormous masses of ice came out of the north, and down from the Alps, covering hill and vale alike with a frozen sheet hundreds of feet thick.

The map (Fig. 9) shows the maximum extension of the ice-sheet. The great glaciers coming from Norway and Sweden left the south of England free, but in Germany pushed on further south to the slopes of the Harz and the Giant Mountains, and covered a great part of central Russia. Meanwhile the Alpine glaciers spread as far as Lyons and Munich.

As will be seen from the map, large areas remained free from ice. But the climate was raw and inhospitable, and soon killed off many of the Pliocene animals and plants. Other animals which were able to do so migrated south in search of new homes. Many other species, however, remained behind and became adapted to the newer and severer conditions.

As we have already remarked, the conditions during the Pleistocene or Glacial Period were by no

means unchanging throughout its course; there were times when the climate was less Arctic in character, these intervals being known as the "Inter-glacial Periods,"—or "Inter-glacial Phases" as they may be called. Now according to Penck and Brückner, well known authorities, there were four epochs of severe

Fig 9.—Map showing the maximum extension of the ice-sheets during the Glacial Period. (After de Geer).

glaciation, with consequently three inter-glacial phases between them. The Glacial Phases have been named "Günz," "Mindel," "Riss," and "Würm,"—G. M. R. W, being in alphabetical order, the position of each member of the series can be easily remembered.* Table III shows the phases of the Pleistocene, and the length of time assigned to each inter-glacial phase by Penck.

* These terms are derived from the names of rivers in Austria and South Germany.

Table III.

Pleistocene or Glacial Period: $\frac{1}{2}$—$1\frac{1}{2}$ million years.

Divisions	Human Races	Predominant Animals	Stages of Culture during the Early Stone Age.
Fourth Glacial Phase (Würm)	**Cro-Magnon Race** (Reindeer-hunters)	**Stag** **Reindeer** **Mammoth** Rhinoceros tichorhinus	**Azilian** (Maz d'Azil, Pyrenees) **Magdalenian** (La Madeleine, Dordogne) **Solutrean** (Solutré, nr. Lyons)
Third Interglacial Phase Lasted about 100,000 years according to Penck	**Loesshunters** **Cro-Magnon Race.** **Late Neandertalers** **Loesshunters** (The Aurignacian Race) **Grimaldi Race**	**Horse** Rhinoceros tichorhinus	**Solutrean** (Solutré, nr. Lyons) **Aurignacian** (Aurignac, Haute Garonne, France) **Mousterian** (Le Moustier, Dordogne)
Third Glacial Phase (Riss) The Chief Ice Age	**Neandertal Race**	**Mammoth** (Elephas primigenius)	**Mousterian** (Le Moustier, Dordogne)
Second Interglacial Phase Lasted 200,000 to 300,000 years according to Penck	**Neandertal Race** Eoanthropus dawsoni?	Elephas antiquus Rhinoceros mercki **Cave-bear, etc.**	**Mousterian** (Le Moustier, Dordogne) **Acheulean** (St. Acheul, near Amiens) **Chellean** (Chelles, nr. Paris) **Strépyan** (Strépy, nr. Mons, in Belgium)
Second Glacial Phase (Mindel)		**Mammoth**	
First Interglacial Phase Lasted about 100,000 years according to Penck	First use of Fire?	Elephas meridionalis	Rostro-carinate (Icenian) Paleoliths. (Suffolk, England)
First Glacial Phase (Günz)	Homo heidelbergensis?	Rhinoceros etruscus	Eoliths (Many localities)
Pliocene	**Ape-man** (Pithecanthropus erectus)		

Early Stone Age (Paleolithic and Eolithic Implements)

The reader must be warned, however, that such a table as this is to a great extent artificial, and exhibits very imperfectly the facts as they really occur in nature. For the various strata and phases and races included in the table are really spread over a large area, and the series cannot be traced through in any one spot; and this the table necessarily cannot show.

The fourfold character of the Glacial Period which is brought out in the table is not applicable, however, to all the parts of Europe that were covered with ice. Penck and Brückner founded their opinions on evidence obtained in the region of the Alps. Geikie holds for instance, that there were no fewer than six distinct phases of glaciation in England, though his opinion on this point is not universally accepted. On the other hand it is held by many scientists that in Sweden and in North Germany there was but a single continuous period of glaciation,—always allowing of course for local recessions of the ice here and there. And again, Rutot's researches in Belgium and France seem to confirm Geikie's contention for England; for he believes that there were four Quaternary glacial phases in Belgium, which were preceded by another like phase before the close of the Pliocene. There is thus still much divergence of opinion about the details of the Great Ice Age. And it may be that on some points no certain conclusion will ever be possible. For instance, in the case of the great plain of North Germany it is almost impossible to be sure how many glacial phases there were. For each succeeding advance of the ice must have confused, moved, and destroyed the signs left by the preceding advance; all would be a confused medley of moraines and boulders, so

that an accurate interpretation of the phenomena would seem an impossible achievement.

The whole matter has been well summed up by Steinmann in these words :—

"We are now compelled to say that what is called the Pleistocene Period does not consist of a single glacial period, but rather of several, so far as we know at present of four, completely distinct glacial periods, which were separated from one another by warm inter-glacial periods, having a climate at least as mild as that now existing. In the Pleistocene, then, there were four glacial cycles. This irrefutable fact is the conclusion drawn from many and often very laborious researches that have been carried out in various parts of Europe and America during the last few decades."

Between the glacial phases, therefore, there were intervals during which the climate was equable; and the duration of these inter-glacial phases must be estimated at many thousands of years.

Each time that the ice-sheet receded, the country far and wide was bare of vegetation, and little was to be seen except immense moraines stretching away in every direction. But before long mosses and other plants began to reappear, and the plains of Northern Europe became a wide expanse of tundra and steppe. The steppes were swept at times by violent dust-storms, which piled up banks of dust—what are called the "Loess" deposits. The "Loess" is particularly characteristic of the last inter-glacial phase. We constantly find evidence that the climate was somewhat arid, and no doubt the country was inhabited for a time by a fauna suitable to steppe-lands.

Later on, the vegetation would have become more luxuriant, forests grew up and flourished, until at last the glaciers advanced once more, blotting out all the life which had appeared during the warm interval.

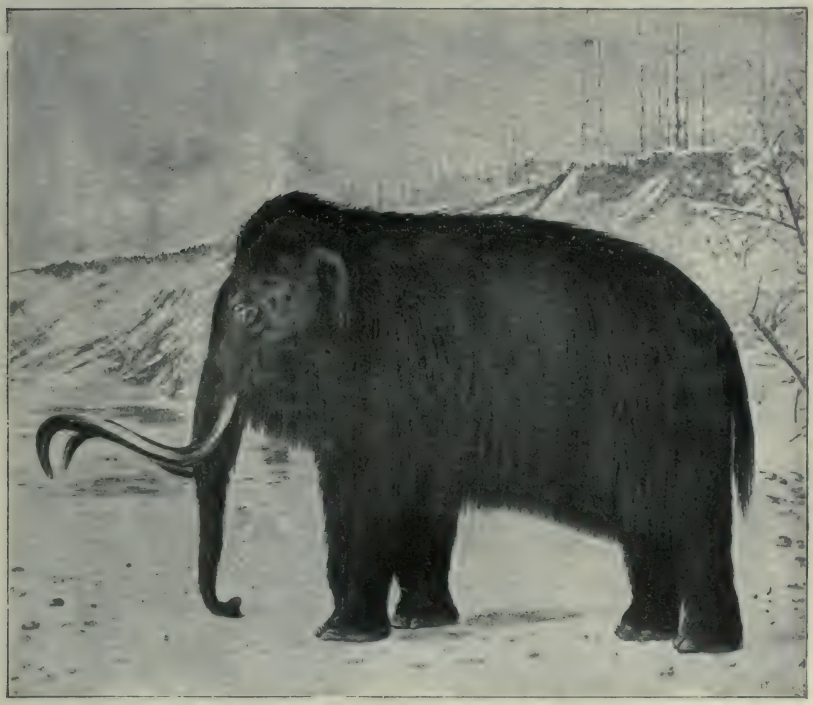


Fig. 10.—Mammoth; reconstructed according to the most recent discoveries. It used to be supposed that the points of the tusks curved upwards, and they were represented on that assumption in earlier modern reconstructions.
(After Pfizenmayer from Leche).

Throughout the colder phases of the Pleistocene, the country near the ice-sheet must, as already stated, have had a very raw climate. But after all a large part of Europe remained free from ice and even

districts not far from the glaciers may have had quite a rich vegetation. This is to be seen to-day in Tierra del Fuego, a country with a very humid climate; and when I voyaged along this coast some years ago, I was much struck by the wonderful sight presented by the glaciers flowing down into the forest belt. The contrast was most picturesque. Thus it is reasonable to believe that the Pleistocene climate, even when most severe, was not necessarily very much colder than that which we now enjoy.

Whilst these changes in climate were taking place, the configuration of the continent was also undergoing considerable variation. The bed of the sea was raised and then sunk once more, but in the main Europe was of greater area during the Pleistocene than it now is, much of the North Sea, the English Channel, and the Mediterranean being then dry land. Thus the British Islands were part of the continent during the Glacial Period, the Atlantic coast being far to the west of the present limits of Ireland, and for this reason England shared in the changes of fauna and human inhabitants that affected France and other countries further south. The final insulation of Great Britain did not come about until after the last retreat of the ice-sheet, and the land connexion endured long enough for most of the present European mammals to swarm across into England, accompanied by the advancing multitudes of Neolithic man.

I explained in Chapter I. that the earliest human implements, the eoliths, have been found in the Upper Miocene and in the Pliocene, in which strata they are to be regarded as the predominant, if not the only, type of tool. Eoliths are also found in Glacial

deposits, but here of course they were being superseded by superior implements. The next great stage in the upward march of human culture is called the Paleolithic Period, or the "Early Stone Age." Paleolithic implements may be defined as stone implements that are chipped with some skill, with sufficient skill at all events for their artificial character to be indisputable, but which are never polished after the manner of Neolithic implements. The term paleolithic is, however, a very wide one, since it includes implements of several quite different types, some roughly hewn, others most artistically shaped, and hence the Paleolithic Period (which was enormously long) has been divided into several ages, as shown in Table III.

Until recently the most ancient paleoliths known were of Pleistocene date. But in 1909 a novel type of flint tool was discovered below the latest Pliocene (or earliest Pleistocene) strata of England, numerous specimens being unearthed, and it is probable that this form of implement was used in conjunction with eoliths as far back as the Miocene, since a few of them are said to have been found in the Upper Miocene, at Aurillac, in France. (See footnote, page 12). In the east of England, in Norfolk, Suffolk, and Essex, there are a number of geological strata, known as the "Crag," which it has been customary to regard as Pliocene.

The Crag consists of several distinct strata,—the Coralline, Red, and Norwich Crag and so on—which were laid down at different times. At the time when the lowest, or Coralline, Crag was deposited, the climate was warm, the southern part of the North Sea being then shut off from the cold

waters of the Arctic by a land-bridge that connected Scotland to Norway. There is, however, a sharp line of demarkation between the Coralline and Red Crag in this respect. The Red Crag was deposited after the land-bridge had given way, and under much colder conditions, the molluscs living in Red-Crag times being of a more or less Arctic character.

Now in 1909 Reid Moir discovered a number of flint implements in the basal layers of the Red Crag, which must therefore have been fashioned by man before the Red Crag was laid down. Most of these are of a somewhat novel type. They are large implements, many of them four or five inches long, which are slightly compressed from side to side (but not flattened like a leaf as are Chellean and later paleoliths) and have a slightly curved point like the beak of an eagle—hence they have been called the "rostro-carinate" type of implement. (Fig. 11).

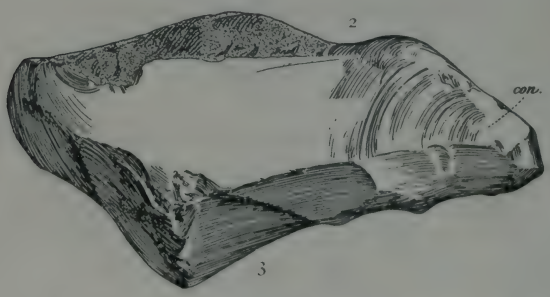


Fig. 11. — Flint implement found at the base of the Red Crag, near Ipswich, Suffolk. Viewed from the right side. Con. = conchoidal fracture. 1 = point of tool. 2 = upper surface. 3 = lower surface. The tool has broad upper and lower surfaces. Scale, $\frac{2}{3}$ linear.

(After Ray Lankester*).

* My best thanks are due to Sir Ray Lankester for permission to reproduce this figure. — AUTHOR.

There is but a rough likeness to a bird's beak in these Crag implements, but a few implements in which such a resemblance is very marked have been found in the much later "Mid-Glacial" strata of the same part of England. The Crag implements differ very little from the ordinary Strépyan "hand-wedge"—the most ancient paleoliths previously known—to be described immediately. (Compare Table III.)

Some of the implements have been scratched by ice, proving that the climate was glacial when the Red Crag was being formed, and it is therefore safe to infer that the implements were in use before (probably not long before) the First Glacial Phase,—no doubt that phase which Rutot describes as Pliocene. It would, however, be more accurate to describe these Red-Crag strata as the earliest deposits of the Glacial (Pleistocene) Period, because, as we have seen, the sharpest change in climate occurs between the Coralline Crag and the Red Crag, not between the Crag deposits and what is conventionally called the Glacial Period.* The sub-Crag implements have been called the "Icenian" implements, from the tribe of *Iceni*, who inhabited Suffolk in Roman times.

We can now pass on into the Glacial Period, and trace out the gradual improvement in skill shown by the primitive stone-workers. In the earliest phases of the Ice Age there appears to have been little or no advance upon the Pliocene and Miocene eoliths, except no doubt in special localities, such as the East of England, where favorable surroundings or some other circumstance caused some roving tribe to outpace its fellows. Thus the indefatigable Rutot has

* This point has been well emphasized by Ray Lankester. The Coralline Crag is, however, a truly preglacial, a real Pliocene, deposit.

worked through a number of Belgian strata belonging to the First Inter-glacial Phase, and has been unable to find therein any implements more shapely than the eoliths. In the Second Inter-glacial Phase, however, very considerable progress was made, a fact that need not surprise us, seeing that this warm interval was of very great duration. At this time a rough paleolith appears, a crude hand-wedge, of which many examples have been found near the village of Strépy, in Belgium, the type being consequently known as the "Strépyan." These implements are somewhat almond-shaped flints, with the natural round contour left unchipped at one end, and having the other end chipped into a point. Two of these primitive paleoliths

Fig. 12

Fig. 13.

Figs. 12 and 13.—Strépyan type of paleoliths. From Belgium. Half actual size.
(From Verworn).

are shown in the illustration (Figs. 12 and 13), representing stones discovered in Belgium. These hand-wedges are very widely distributed, and occur also among other implements in higher (and therefore

newer) strata. This admixture of older and newer types of implements is a dangerous source of error in prehistoric anthropology, and it must never be forgotten that the more ancient methods of tool-making usually survived the first introduction of the more modern technique. Thus neolithic implements were in use long after man had discovered how to work copper and bronze, and it is only here and there, in special localities (such as a cave), that the series of types can be traced out with clearness and completeness. These Strépyan implements are smooth, roundish lumps of flint that lie very comfortably in one's hand, but before very long they were succeeded by other implements that were chipped all round, thus becoming lozenge-shaped. It seems that the savages took great pride in flaking their hand-implements all over the surface, although by so doing they made

Fig. 14

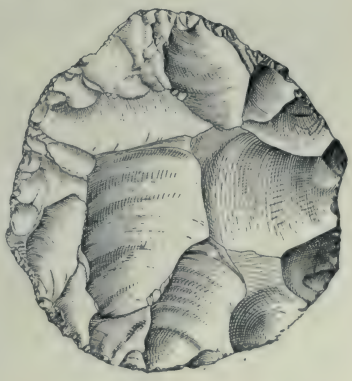


Fig. 15

Figs. 14 and 15.—Palæolithic implements of the Chellean type. Fig. 14 is from the Chellean of La Mérigaude (France), and Fig. 15 from the Chellean of Thebes (Egypt). Scale, $\frac{2}{3}$ the actual size. (From Verworn's collection).

them much less convenient to grasp. The lozenge-like implements first occur in somewhat newer strata (the so-called Chellean—from the place Chelles near Paris,) though these again survive into later epochs. (Figs. 14 and 15). The next step was to sharpen the point of the stones, which gives us the "Acheulean" type, (Figs. 16 to 18,) and thus the skill of the Glacial

Fig. 16

Fig. 17

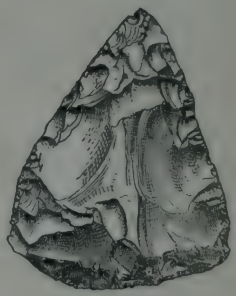


Fig. 18

Figs. 16 to 18.—Paleolithic implements of the Acheulean type. Scale, ½ the actual size.
(From Verworn's collection).

Europeans steadily advanced until at last they were able to fashion the beautiful javelin-heads of the much later "Solutrean," stage shown, in Figs. 19 to 26. These javelin-heads were fixed into a shaft by means of resin or were bound to the shaft with the sinews of animals, used as string. If Figs. 12 and 13 be compared with Figs. 20 and 25, it will be seen how enormous is the progress that was made during the Paleolithic Period. The tribes who lived at the end of the Glacial Period were cave-dwellers and mere hunters who knew nothing of domestic animals or of

Fig. 19

Fig. 20

Fig. 21

Fig. 22

Fig. 23

Fig. 24

Fig. 25

Fig. 26

Figs. 19 to 26.—Different forms of Paleolithic arrow-heads of the Solutréan Age. Fig. 24 is $\frac{2}{3}$ the actual size; the remainder are drawn of the actual size. Figs. 22 & 23, and 25 & 26, show the two sides of two specimens respectively. (From Verworn).

Fig. 27 Fig. 28 Fig. 29

Figs. 27 and 28. — Javelin-points made of ivory; of the Solutréan Age. Scale, $\frac{2}{3}$ the actual size

(From Verworn).

Fig. 29.—Harpoon-head made of reindeer-horn; of the Magdalenian Age. Scale, $\frac{2}{3}$ the actual size.

(From Verworn).

agriculture or of pottery-making, but they had clearly emerged from the depths of savagery. At the end of the Pleistocene, too, bone and ivory were used to make tools and weapons (Figs. 27 to 29) as well as stone, and during the last severe climatic phase beautiful little harpoon-heads were made by the people who then inhabited France. Bone was not used until long after stone was first turned to account, but crude bone-implements are known from Middle Paleolithic times, from the Mousterian. (See Table III.)

CHAPTER IV.

THE NEANDERTAL RACE.

AS I explained in Chapter I. all the remains of mankind known until the discovery in the Neandertal in 1856 were closely similar to one or other of the races living at the present day. All the existing races and many of the less ancient extinct races are to be grouped together in one species, *Homo sapiens*, but Neandertal man was of a very distinct type, and he has consequently been placed in a different species, called *Homo neandertalensis* or *Homo primigenius*. It is possible that existing man may be descended from Neandertal man, but it is also possible that no such paternal and filial relationship exists between them, and that they are different kinds, "cousins," offspring of a more or less distant common ancestor. This subject and the relationship of both kinds to the Javan ape-man are still matters of controversy.

So long as we possessed only the original skull already described, there was a sharp divergence of opinion among scientists as to whether the relic should be ascribed to a member of an extinct race, or whether it was merely the cranium of a degenerate and diseased individual of the living species. This controversy is now only a matter of history, for in the sixty years that have elapsed since the first discovery many other similar relics have been unearthed, and there is now no doubt that a definite Neandertal race was widely spread over Europe during the

earlier part of the Glacial Period. The Neandertalers flourished in many parts of the continent during the Second Inter-glacial Phase, and some of the more important skeletons that have been found from time to time may be briefly described. The existence of the Neandertalers as a distinct race was placed beyond all doubt in 1886. In that year two human skulls, and various other parts of two skeletons, were found in front of a cavern near Spy, in the province of Namur, Belgium. The skeletons lay beneath a layer of tufa, close to the remains of sundry Pleistocene quadrupeds, and it is generally held that they date from the end of the second warm interval, or perhaps from the succeeding ice-age. A fairly complete skull-cap was found, and this bears a strong resemblance to the cranium found in the Neandertal. Fortunately a portion of the upper jaw and a great part of the lower jaw (or "mandible") were also preserved. (Fig. 30). The teeth far exceed in size those of

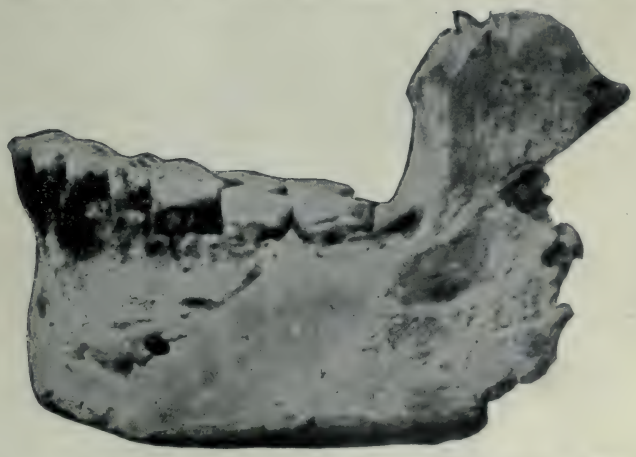
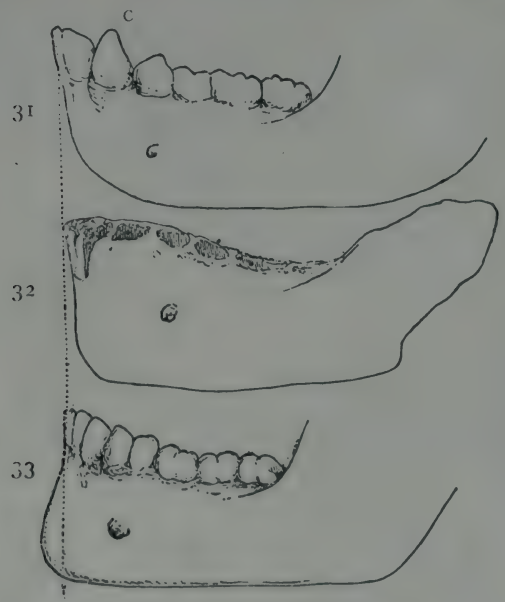


Fig. 30.—Lower jaw of a Neandertaler discovered at Spy, in Namur, Belgium. (After Fraipont from Leche).

average modern Europeans, and the absence of a chin is again noticeable, though the lower jaw does not pass backwards so sharply as in the case of the massive mandible of the still earlier *Homo heidelbergensis*, hence showing some advance towards the modern condition—though that by no means necessarily proves that we have evolved upwards through a Neandertal stage. A number of the earlier discoveries of Neandertalers must be omitted from this account (that of the well-known Gibraltar skull among others), since owing to the wonderful finds in recent years they are no longer of so very much importance.



Figs. 31 to 33.—No. 31, lower jaw of chimpanzee; 32, of a fossil man found in the cave "La Naulette" in Belgium; and 33, of a modern European. C = Canine. Notice the large projecting corner tooth, or "Canine," in Fig. 31. (After Topinard from Leche).

I must, however, mention the discovery of a lower jaw in the cave "La Naulette," in the banks of the river Lesse, in Belgium, in 1866. In Figs. 31, 32, 33 this mandible is illustrated in comparison with those of a chimpanzee and a modern European respectively, and the figures show clearly the gradual development of the chin. It must not be supposed that mankind is descended from a chimpanzee, or from any similar ape, but in this particular feature—the chinless lower-jaw—the chimpanzee has undoubtedly retained the condition that was present in the common ancestor of apes and men.

One of the most interesting of recent discoveries was made in Croatia, a province of Hungary, by Professor Kramberger in 1901. In an ancient cavern in the valley of a little river called the Krapinica, and not far from the town of Krapina, Professor Kramberger carried out some painstaking excavations and brought to light the remains of about ten human beings, men, women and children. At the time when this cave was first inhabited, it was sometimes flooded by the river, as is shown by the fact that silt left by the river covers the ancient floor of the cave, but the Krapinica now flows about eighty feet below this level. It is clear that a very long time must have been necessary for the river to wear its bed down a depth of eighty feet. The human remains were all in a most fragmentary condition. Some of the bones, though perhaps not all, belonged to men of the Neandertal type, but the condition of some of the remains throws a flood of light upon the habits of the European savages in Pleistocene times. Many of the bones are smashed, and burnt, and others have been split open with the evident purpose of extracting the marrow from them. Hence we may infer with some

confidence that a cannibal feast was held in this cavern, the scattered remains being preserved through hundreds of centuries for our edification. Professor Klaatsch holds that the relics tell us still more of this somewhat gruesome story. He believes that some of the bones do not belong to men of the Neandertal race, but to another and higher race—the Aurignacian race which I shall describe later. Klaatsch believes that a tribe of Aurignacians came upon a band of the more primitive Neandertalers, and after a great slaughter set to work to devour their victims in the cave. This is an imaginative picture, but though no doubt the condition of the bones testifies to cannibalism, the discoverer, Kramberger, altogether denies that the remains belong to these two very different races. He believes that Klaatsch's supposed Aurignacian bones are merely those of more youthful persons, but other authorities support Klaatsch's contention. Amongst the other human remains, fragments of the facial portions of some neandertaloid skulls were preserved. The very wide space between the eyes in one of these specimens proves that the original owner of the skull had an extraordinarily broad snout-like nose.

In 1908 our knowledge of ancient man was enriched in an unexpected manner. In that year the Swiss archeologist, O. Hauser, discovered the skeleton of a young Neandertaler, who had evidently been buried,—and this is therefore much the most ancient interment at present known. The remains were found near the cavern called "Le Moustier," in the Valley of the Vézère, in the Dordogne, France, a locality long famous for the relics of Pleistocene man that it has yielded up.* Five months later, in

* This skeleton is often referred to under the name *Homo mousteriensis hauseri*, but this must not be taken to mean that it belongs to a species distinct from *Homo primigenius*.

August 1908, a German scientific commission, with Professor Klaatsch as chairman, set to work to dig out the remains, and the extraordinary value set upon the skeleton will be realized when it is stated that this skeleton and another to be described later (the so-called *Homo aurignacensis hauseri*) were purchased for the "Museum für Völkerkunde" in Berlin for the fabulous sum of £8,000.

The skeleton is that of a Neandertal youth, who must have been about fifteen or sixteen years old. He was lying in a sleeping posture on his right side, with his right elbow under his cheek and his right hand at the back of his head. His head rested upon several flint plates, which had been carefully chipped, and formed a sort of pillow. There were numerous partly burnt bones of the auroch (the now extinct wild-ox) lying near the skeleton, which seems to imply that the friends of the deceased desired to provide his spirit with food, and a well-chipped flint implement of the "hand-wedge" type lay by the lad's left hand. It is supposed from the stratum in which the remains were found and from the character of the implements scattered around, that this Neandertaler lived in the Acheulean Age (see pages 26 and 36), which preceded the Mousterian Age, and dates back into the Second Interglacial Phase.*

When we consider this ancient funeral, how truly insignificant seems the whole historic period! A moderate estimate places the date of the interment at B. C. 150,000, and other authorities consider that it is more than twice as ancient as that!

There is yet one other discovery of a Neandertaler, which is worthy of notice, since it throws

* Since the specimen does not belong to the Mousterian Age, the name *Homo mousteriensis* is a most unfortunate one.

considerable light upon the mental endowment of early man. Once more the discovery was made in that fruitful region, the South of France, this time in the department of Corrèze. Only a few days before the disinterment of the Neandertal youth described above, in August 1908, three French investigators unearthed the fragments of a skeleton in a cavern called "La Chapelle-aux-Saints," near the village of the same name.

The remains consisted of a skull, some vertebræ, and a few other bones. The skull is of enormous size, (Length 20·8 cm, Width 15·6 cm) but in shape and form it presents so many brutish features, that it is clearly at a somewhat lower stage even than the Neandertalers already mentioned. The chin is almost completely wanting, the eye-brow ridges are very large, the forehead is very retreating, and the nose is wide and snout-like. If this primitive skull be compared with that of a modern European, the differences are at once striking. (Figs. 34 to 36) The cranial capacity, that is, the size of the brain, has been most carefully investigated, and is found to be quite considerable,—indeed it falls within the limit of normal variation in size that we expect in modern Europeans. It used to be supposed that Neandertal man had a small brain, an opinion that was founded upon the original deductions as to the character of the brain in the Neandertal skull itself (Page 4), but it is clear from recent researches that this was an error and that some at least of the Neandertal Race were well supplied with brain material. This fact has been seized upon by the opponents of evolution, and has been used as a peg on which to hang an argument against the origin of man from brutes. The mere size of the brain is, however, only part of

Fig. 34. -Skull of the Neandertaler found in the cave "La Chapelle-aux-Saints," Corrèze France, with reconstructed lower jaw.

(After Boule).

Fig. 35.—Skull found in La Chapelle-aux-Saints, with the jaw found near Heidelberg. Compare Fig. 7.

(After Boule).

the story, and probably not the most important part. An examination of the shape and form of the brain which once thought and planned within this skull from La Chapelle-aux-Saints yields some interesting and highly significant results. Casts of the interior of the brain-case have been carefully compared with similar casts from the skulls of various races of men, and with those of the manlike apes, and it appears

Fig. 36.—Skull of a modern European. Contrast the shape of this skull with Fig. 34.

that in various important anatomical details the brain of this ancient Neandertaler bore a strong resemblance to the brains of apes,—for instance, in the wide separation of the two halves of the brain ("cerebral hemispheres,") in the shape and the direction of the "Medulla Oblongata,"* in the form of the

* The Medulla Oblongata is the hind part of the brain, and is directly continuous with the spinal cord.—TRANSLATOR.

front part of the brain (beneath the forehead), and in the shape of the hind lobes of the cerebral hemispheres. These hind lobes are quite unlike those of the living *Homo sapiens*. The third lobe* of the brain had left a clear impression on the inside of the skull, and its form is very similar to the corresponding lobe in the Orang-utan, the ape with the most highly developed brain. It seems therefore that in spite of the large size of his brain, this fossil man from the South of France can have possessed only very feeble mental powers. And if it be true, as Broca contends, that the third lobe of the brain is the part which controls the function of speech, then we must conclude that the being in question could talk but a very crude and rudimentary language.

This interesting skull was considerably damaged with age, especially the lower jaw. When repaired the skull presents the appearance shown in Fig. 34. In Fig. 35 the skull is shown along with the lower-jaw of the still more primitive *Homo heidelbergensis*, which brings out the affinity between the two discoveries, albeit the Heidelberg jaw is more massive.

We have now examined some of the most important remains of this extinct type of humanity, and it naturally occurs to one to wonder what was the appearance of men of this race in their lifetime. It is impossible, however, to make more than an intelligent guess at this. It is certainly fascinating to try to imagine the likeness and ways of life of primeval man, and of the still stranger half-men who no doubt existed in Preglacial Europe, but it must be admitted that there is not too much solid ground on which to

* This is the third lobe of each cerebral hemisphere. The cerebral hemispheres are the great paired upgrowth of the front part of the brain, and are enormously developed in man.—TRANSLATOR.

raise one's speculations. A large number of paintings and plaster representations of primitive man have been executed, purporting to illustrate almost every phase from the Javan ape-man up to the present day, but the great majority of these undoubtedly convey quite erroneous impressions. The outline of the skulls is usually very unlike that really possessed by Neandertal man, and the whole physiognomy is apt to bear too strong a resemblance to the living apes. The fact that accurate illustrations of Glacial man are conspicuous by their absence, induced me to attempt to reconstruct the head of a Neandertaler, with careful attention to the outline of the skull, and this appears in Fig. 37. The shape of the face here is at all events approximately in accordance with the bony structure of the skull. I have represented the savage as a beardless person, since the beard is very probably a modern acquirement of humanity.

This snout-like type of face, with the projecting jaws and wide nose, persists to some extent among certain living races, notably among the Australian aborigines, whose skulls have features in common with those of Neandertalers. It would not be safe to infer from this, however, that there is any close affinity between the two races, although Professor Klaatsch is of opinion that some such kinship does exist.

The Neandertalers were a short, sturdily built race, standing about 5 ft. 3 ins. They had short legs, arms of medium length, and were probably very hairy. They walked upright, though doubtless not with military precision. It seems likely that they clothed themselves in skins, and they roamed about armed with great wooden cudgels. They lived in

hordes, but probably no definite tribal organization was yet developed, albeit the strongest males held positions of leadership. This picture differs little from that already given of Tertiary man, but the use of

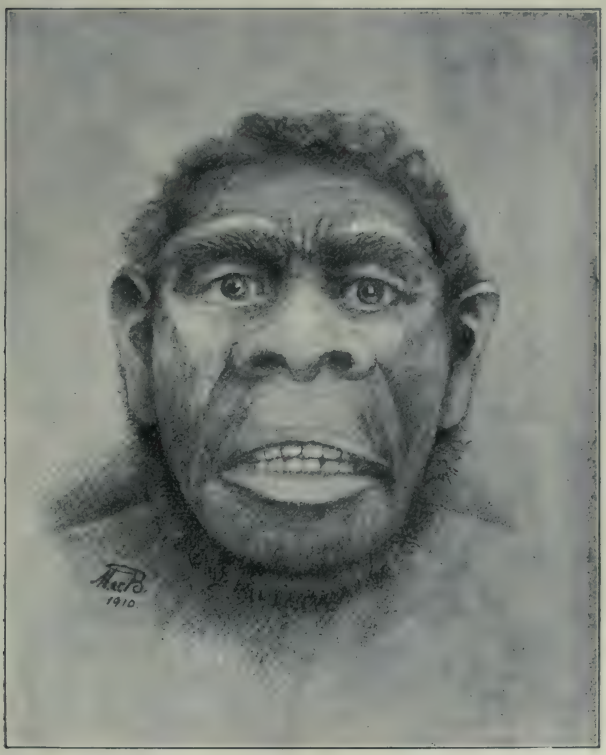


Fig. 37.—Reconstruction of a Neandertaler, from the facial parts of skulls of this race. (Original drawing by M. v. Buttel.)

fire had been discovered in the interval, and the improvement in the stone implements made the struggle for existence less terribly severe. Our knowledge of modern savages helps us to some extent

in our attempts to form an idea of the kind of life that the Neandertalers led. Thus we may infer from the state of affairs among the most primitive peoples now living that there was nothing in the nature of a family-organization in early Pleistocene times. In the lawless nomadic hordes, might was right,—in the possession of wives as in other matters. But when the most formidable male came to be recognized as chief, and had perforce to be obeyed, the first dim ideas of law and of property dawned upon the barbarian mind. Nevertheless, for tens of thousands of years progress in social life must have been laborious in the extreme, owing to the very defective speech of the Neandertalers. Since there was no marriage, the woman was regarded as the owner of the child, such kinship as was recognized being purely matriarchal. Such were probably the conditions under which early man lived, but it must not be forgotten that the picture drawn here is largely a speculative one, and where the imagination plays so great a part, it is possible to go very far wrong.

After the close of the third and greatest glacial phase, the remains of the Neandertal race are still found in widely separated localities in Central Europe, and it was at this time that the lower type and higher races of mankind were living side by side.

CHAPTER V.

HIGHER RACES OF THE ICE AGE.

ABOUT the middle of the third and last interglacial phase the Neandertal Race seems to have become extinct in Europe, but some time before its disappearance a new and higher type of mankind had arrived in this continent. The new type approached the existing representatives of *Homo sapiens* in many of its characteristics, and from the fact that several races are found in Europe at the end of the Glacial Period it has been inferred that a certain amount of intermixture took place between the Neandertalers and the more advanced people. Be that as it may, it is certain that the two species lived side by side for a considerable period.

During the last warm interval there were great expanses of steppe in many parts of the continent, and the dust storms which took place formed numerous dust hills—the peculiar accumulations of clay known as the "Loess." Now the skeletons of the new type, the precursor of modern man, have been found in considerable numbers in this Loess, and hence the new race is often described as the "Loesshunters"—for the tribes were still in the hunting stage and knew nothing of the pastoral art. It is almost certain that the later Cro-Magnon race, the artists of the South of France whom I shall describe later, were evolved from the Loesshunters.

There is no lack of the remains of these Loess-hunters. One of the most interesting discoveries was made in a sewer below the streets of Brünn, in the province of Moravia, Austria. A human skeleton was found lying close to the bones of the rhinoceros and the mammoth, surrounded by a number of ornaments, strange little discs of bone and stone. The skeleton, and particularly the skull,* is of the highest significance, since in many respects it approaches the modern European type, but still more interesting than the remains themselves is the discovery near them of a little carved ivory figure of a man (Fig. 38). Few things in the recent advances of scientific knowledge have been so surprising as the proof that

Fig. 38.—Figure of a man cut in mammoth-ivory. Found close to the skeleton discovered at Brünn, Moravia.
(After Hoernes).

* This specimen is often styled Brünn I. by scientists, since another skeleton is known from Brunn—which was less well preserved.

we now possess of the extraordinarily early development of the artistic talent among mankind. It will be noticed that the forehead is low and retreating, and the nostrils are wide,—in this respect being somewhat Neandertaloid. The body is without clothes, and is flat in front and roundish behind. Only the left arm is preserved, but it has been carved in a most painstaking manner.

The hunters of the Loess were widely spread over Europe, and in many places their chief quarry was evidently the wild horse, which roamed the plains in enormous herds. In the valley of the Rhone, near the village of Solutré, (the place which gives its name to the entire "Solutréan" stage of culture), not far from Lyons, the tribesmen have left many relics behind them. For thousands of years they seem to have dwelt at the foot of a spur of the high tableland, which juts out into the lowlands at this spot. The remains of the hunters' feasts, the bones of the horses, cover the ground here over an area of five or six acres, and in places form a layer of débris nearly seven feet thick. Here and there the bones of the horses are heaped up in enormous piles, and are mixed with the less numerous remains of the mammoth and reindeer. The horses may sometimes have been captured by means of a lasso, but more often they seem to have been driven to the edge of the plateau, and over the steep precipice into the plain below, being killed by the fall. This was accomplished either by a great battue or else by setting fire to the grass, thus driving the terrified animals towards the cliffs. Sometimes, too, the hunters dug out pitfalls into which the unwary horses might tumble, though the work of digging with the flint implements then available must have been exceedingly laborious.

If in the Rhone Valley the Loesshunters pursued mainly the wild horse, in other places their chief quarry was that formidable creature, the mammoth. This was the case at Predmost, in Moravia. Here the finds were made in a little hill of Loess, which was about 110 feet high, and is situated close to a cliff of limestone that in former days must have overhung the mound and thus sheltered it whilst the dust was accumulating. (Fig. 39). Huge quantities of the remains of the mammoth have been dug out of this hill, some two thousand

Fig. 39.—View of a hill composed of Loess, at Predmost, in Moravia. Numerous specimens were discovered in this hill, which is now destroyed.
(After Wankel).

cheek-teeth of the animal having been found. The Loesshunters were settled here for a long time, and around their camp-fires they devoured the flesh of many other animals besides the mammoth. Thus there are relics of the horse, bison, elk, chamois, ibex, and beaver, together with those of the carnivores, marten, lion, wolf, cave-hyena, etc., and the more strictly Glacial animals, such as the reindeer, arctic fox, arctic hare, musk-ox, ptarmigan, and the *Rhinoceros tichorhinus*. That many of these animals

were eaten by the hunters is clear from the fact that the bones of the creatures have been torn apart, and then thrown down in a rough kind of order, shoulder-blades being found in one heap, vertebræ in another, pelvic-bones in another and so on. It seems probable that the hunters only encamped here during the summers, retiring in winter to caves. The remains of six human beings have been recovered from this hill, but the skeletons were in a fragmentary condition and therefore not of great scientific value. But about fifteen thousand stone implements have been taken from the mound.

Unfortunately it was not scientists who first discovered that the hill was full of bones. The farmers of the neighborhood had mined the hill for bone for centuries before the true significance of the hidden treasures was made known to the world in 1880. The bones used to be merely ground down and then utilized for agricultural purposes, as a manure, and how much valuable material was destroyed in this way can never be known.

We are now in possession of a skeleton which, being fairly well preserved, has rendered clear the racial characters of the Loesshunters, and for this we are once more indebted to the Swiss archeologist, O. Hauser. In August 1909 this scholar unearthed an ancient skeleton near the road running from Montferrand (in Périgord, France) to Beaumont. The remains were found considerably above the level of the road, about 130 feet higher, and lay beneath a projecting ledge of an isolated cliff on the south side of the highway. The skeleton was buried in the earth to a depth of about ten feet. As in the case of the Neandertaloid skeleton of the so-called *Homo*

mousteriensis, it was Professor Klaatsch who undertook, at the request of Hauser, the laborious work of excavating the remains. Close to the neck a number of pierced snails' shells were found, which had evidently been fastened together to form a necklace, and scattered about near the skeleton there were a number of flint implements of the characteristic Aurignacian type. There is no doubt that we have to deal here with an interment, the corpse having been laid out in a somewhat hunched-up position, with the knees drawn up. The body must have been laid upon the floor of the cave which then existed, and the rock itself was undoubtedly dug out to some extent to receive the body; thus the floor slopes slightly from the head-end downwards, and around the hips a hole about 2½ inches deep and 12 inches long had been dug, the conception evidently being that the dead man was but asleep, and therefore needed to be made as comfortable as possible in his hard resting place. This plan of digging out a shallow hole around the hips is one still adopted sometimes by soldiers and others who have to sleep out in the open, and it is well known by them that the posture thus adopted is a comfortable one.

The illustration of this skull (Fig. 40) brings out clearly the immense gap which separates its owner from Neandertal man, and similar divergences from the more primitive stock are also discernible in other parts of the skeleton. The absence of a chin, however, and other points, show that the man was of an early type, much less advanced than his Cro-Magnon successor. A skull very similar to this one has been discovered in England, at Galley Hill, near Northfleet, not far from the mouth of the Thames. This too is a very ancient relic, and the cranium agrees with the

French specimen in being extremely long in proportion to its breadth, and in other features. We are justified in concluding, therefore, that this race of Loesshunters was widely spread over Europe.

Fig. 40.—Skull of a member of the "Aurignacian Race," discovered in Périgord, France. (This specimen is the so-called *Homo aurignacensis hauseri*). Notice the high forehead and absence of brow-ridges, typical of *Homo sapiens*.
(After Klaatsch).

In addition to the Loesshunters another race appeared at about the same time, a race much higher than the Neandertalers, but nevertheless quite distinct from the Loesshunters and showing certain affinities with the negro or negroid races living at the

present day. In the Red Rocks ("Baoussé—Roussé") near Mentone, France, there are a number of caves, one of them being known as the "Grotte des Enfants." It derives its name from the fact that in the upper strata of the floor the skeletons of two children were discovered—and also that of a woman. These, however, do not concern us now. Excavations were made through whole strata, the floor being nearly thirty feet thick from the accumulation of cave-earth and other matter, and towards the base the skeleton of a man was found, whose height must have been about 6ft. 2in. These four individuals belonged to the Cro-Magnon Race.

But immediately below the skeleton of the man, though in another stratum from the cultural point of view, two more skeletons were found which belonged to a very different race. They lay almost upon the rocky floor of the cave, that is, the floor of the cavern itself, prior to the accumulation of the various layers of débris. The two skeletons are small and are those of a woman and of a youth, probably mother and son. The height of the woman was about 5ft. 3in. and that of the boy slightly less. The corpses had never been buried, but were laid upon the floor of the cave, and the boy, who was perhaps 16 years of age, lay with his arm around his mother. Three stone plates formed a kind of protection over one of the skulls, and various bracelets and necklaces of snails' shells were found by the remains, together with a few primitive stone implements. As already remarked, these two individuals exhibit negroid characteristics, such for instance as projecting cheek-bones, markedly prognathous jaws, and sloping teeth. (Fig. 41) By some authorities these characters are held, however, to ally this race more to the Australians than to the negroid peoples,

and Klaatsch believes that there are some affinities with the Cro-Magnon Race. However this may be, the type is a distinct one, and it has been named the Grimaldi Race, after the family name of the Prince of Monaco, under whose patronage the excavations were carried out. There is also some

Fig. 41.—Skull of a youth found in the *Grotte des Enfants*, near Mentone. Example of the negroid "Grimaldi Race." Notice the fairly high forehead and absence of brow-ridges, but also the protruding jaws.
(After Reinhardt).

divergence of opinion as to the date to which this Grimaldi people should be assigned. They probably flourished in the last inter-glacial phase (see Table III.) but some writers place them as late as the last glacial phase.

Perhaps the most interesting thing about this prehistoric negroid race is that it has been associated with a number of Pleistocene works of art, carved

Fig. 42 Fig. 43

Figs. 42 and 43.—Ivory torso found in the *Grotte du Pape* (Brassempouy). Scale, $\frac{5}{6}$ the actual size. Shown from two aspects. (After Piette, from Verworn).

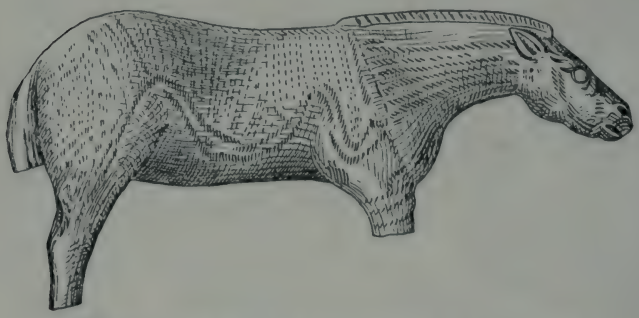


Fig. 44.—Horse carved in ivory, found in the *Caverne des Espélugues*, near Lourdes, France. Slightly enlarged. (After Piette, from Verworn).

figures and so forth, that have been discovered from time to time in the South of France, some at least of these relics being undoubtedly of a negroid character. A great deal of doubt has been thrown upon these specimens, but they are vouched for by the very highest authorities, so that scepticism becomes mere perversity. Certainly the sculpture is of a surprisingly high order, but the children of the Hottentots of South Africa are to this day much given to fashioning little figures of clay, and such are very skilfully executed. The specimens in question were found in caves on the northern slopes of the Pyrenees (Lourdes, Maz d'Azil, etc.), and in Gascony (Brassempouy). In 1892 an ivory figure of a woman, with protruding body and general Hottentot shape, was discovered in Brassempouy. This steatopygous form is of course characteristic of the Hottentot women. Some similar figures have been found in the Mentone caves, and the first statuette, which is about three inches long, has been named the "Venus of Brassempouy," a name that would have been more applicable to the little torso of ivory (Figs. 42 and 43) discovered at the same place four years later. The figure of a horse and two horses' heads are also shown (Figs. 44 to 46). What looks like a bridle on Fig. 46 is probably only ornamentation, as there is no evidence that horses were domesticated at that period. The woman's head, with the low forehead and peculiar dressing of the hair and no mouth, and the curious female figure cut out of a horse's tooth are also very remarkable. (Figs. 47 and 48).

At the close of the Glacial Period the Cro-Magnon race, famous for its great stature, its working in bone, and its art, became the dominant people.

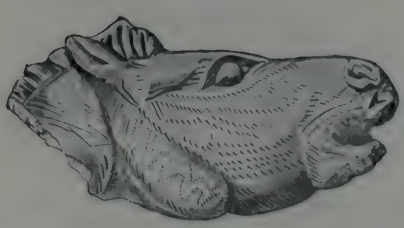


Fig. 45

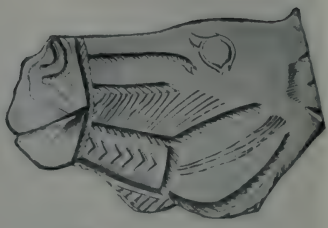


Fig. 46

Fig. 45.—Horse's head carved in ivory, with ornamental engraving. From the cavern Maz d'Azil (Ariège). Drawn of the actual size.

(After Piette, from Verworn).

Fig. 46.—Horse's head carved in ivory, with ornamental engraving. From Saint-Michel d'Arudy (Pyrenees). Drawn of the actual size.

(After Piette, from Verworn).

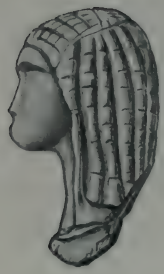


Fig. 47

Fig. 48

Fig. 47.—Head of a woman, carved in ivory. Found in the *Grotte du Pape*, near Brassempouy. Drawn of the actual size.

(After Piette, from Verworn).

Fig. 48.—Woman's figure carved in a horse's tooth. From the cavern Maz d'Azil. Drawn of approximately the actual size.

(After Piette, from Verworn).

It surpassed the other races in the height and form of its skull, which was nearly as finely developed as that of modern Europeans. Indeed, the brain was very large, even judged by the modern standard. The name "Cro-Magnon" is derived from that of

Fig. 49.—Woman's skull from the cave "Cro-Magnon" in the valley of the Vézère, South of France. Notice the high forehead and absence of brow-ridges.

(After Klaatsch. Taken from the skull itself in the Musée du Jardin des Plantes, at Paris.)

the cavern in which the first representatives of this stock were unearthed, but many other specimens have been found, such for instance as those already mentioned from the "Grotte des Enfants," at Mentone, and a skeleton from "Gough's Cave," near Cheddar,

in England. The Cro-Magnon Race was probably directly descended from the earlier Loesshunters, and they evidently lived mainly by hunting reindeer. A skull of a Cro-Magnon woman is shown in Fig. 49. It appears that a stone axe was driven through her cranium, putting a premature end to her life.

THE SUSSEX FIND.

In December 1912 a skull was described to the Geological Society of London by Mr Charles Dawson and Dr Smith Woodward that is certain to prove of great importance in elucidating the ancestry of the existing species of mankind. The skull, including a portion of the lower jaw, was discovered by Dawson near Piltdown Common, in Sussex, England. The importance of the find lies in the fact that the relic is unlike all other ancient skulls ; it is quite distinct from the skulls of both *Pithecanthropus* and the Neandertalers ; and it certainly belonged to a being much more primitive and more ancient than the Loesshunter. In order to emphasize this isolated position of the skull, the race of which it is the first discovered representative has been placed by Woodward not only in a new species, but—an extreme step—in a new genus, and has been given the name *Eoanthropus dawsoni*.

The gravel in which the find was made was deposited by the river Ouse, when that stream flowed at a level some eighty feet higher than it does now. In the same deposit, a number of water-worn eoliths, resembling the Pliocene eoliths of the Kent Plateau, were discovered, and, what is more important, some unworn paleolithic implements of the Chellean type were also found. If, as seems probable, the skull is contemporaneous with the Chellean

implements, the age of the former may be fixed as Early Pleistocene. (See Table III.) There is little reason to doubt that the remains are coeval with the paleoliths and not with the eoliths. The skull and the jaw were embedded quite close to each other, and the angles of the relics were not worn down, both of which circumstances go to prove that the bony remains, like the paleoliths, had not been rolled far by water.

Various animal remains, such as the teeth of the hippopotamus, the horse, and the beaver, were found near the skull. Fragments of the teeth of the great Pliocene elephant, *Elephas meridionalis*, and of a mastodon (likewise a Pliocene beast) were also discovered; these fragments were, like the eoliths, in a waterworn condition, and prove that the gravel was partly composed of the remains of some Pliocene deposit, probably a higher and older gravel of the river Ouse.

The remains found consist of a large part of the left side of the skull, and part of the right side of the lower jaw, but unfortunately the front portions of both skull and jaw are missing. The bones are believed to be those of a woman, and the whole skull, as reconstructed by Dr Woodward, presents the appearance shown in the frontispiece.* The capacity of the brain-case is about 1070 cubic centimeters, and the bones are nearly twice as thick as those of modern skulls. The forehead is much higher than in the Neandertal Race, and there are only feebly-developed brow-ridges, so that in these important respects the Piltdown men resembled the modern species. The shape of the upper part of the skull is thus thoroughly human, and may be compared with Fig 40, the skull

* I am very much indebted to Dr Woodward for his kindness in allowing me to reproduce two of his pictures of *Eoanthropus*.—Author.

of the so-called *H. aurignacensis hauseri*,* and the low cranial capacity is partly accounted for if the Piltdown specimens be of the female sex. The lower jaw, however, is very remarkable, and presents one small but interesting anatomical feature, which is perhaps of greater significance than any other character of the skull. Jutting in from the jaw where it is broken off, there is a small plate of bone, (S in Fig 50), which evidently met its fellow of the opposite side, thus making a very short bony floor to the jaw in the front. In other words, the extent of the bony union (or "symphysis") of the two sides of the jaw in the front

Fig. 50.—Lower jaw found at Piltdown Common, Sussex. Reconstructed and viewed from above. The parts actually known are shaded.

(After Dawson and Woodward in the "Quarterly Journal of the Geological Society," March, 1913).

* This *H. aurignacensis hauseri* is often known under the synonym of the "Combe-Capelle skeleton."

is very great, and in this respect the jaw is apelike. This piece of bone marked S is absent not only from our own jaws and from those of the Neandertalers, but also from the Heidelberg mandible, although the hind part of the latter jaw is more massive. The chimpanzee, however, possesses a similar little piece of bone.

In the restoration, the creature has been given almost apelike front teeth, and it is certainly clear from the curve of the jaw that the teeth were larger than ordinary human teeth, though the exact shape of the bone remains a matter for speculation. The two molars preserved are quite human, and were ground flat in mastication. The jaw was no doubt chinless like other very ancient mandibles, but I am inclined to think that the anterior curve of the jaw passed more sharply upwards than in Woodward's reconstruction (see frontispiece), and that the whole of the front of the jaw, and consequently the front teeth, were somewhat smaller and more human* than he believes. This would appear to be rather more congruous with the quite human upper parts. From the primitive character of the jaw, however, it is probable that the creature's speech was rudimentary.

Judging from the high forehead and absence of brow-ridges, it would seem that the men of Piltdown are more likely than are the Neandertalers to have been the direct ancestors of the Aurignacians. It is possible therefore that the direct ancestors of modern man were living in Europe far earlier than has been supposed. On the other hand, the Piltdown stock may very likely have been a primitive out-lying race which became extinct, and the Loesshunters immigrants from another continent.

* Even an Oligocene monkey, named *Propliopithecus*, which was very likely ancestral to all the forms leading up to mankind, had very small canine teeth. (See page 77).

Note added to press. On August 30th. 1913, one of the missing canine teeth was discovered at Piltdown. It is somewhat smaller than the canines in the reconstruction, but considerably larger than all other known human canines. The canines of *Pithecanthropus* were not found.

CHAPTER VI.

MEN, PRE-MEN AND APES.

AS we have already seen, the race of Loess-hunters, or the Aurignacian Race as it is otherwise called, appeared somewhat suddenly, and by subjugating or exterminating the Neandertalers, at least in Europe, no doubt occupied and possessed the country far and wide. That the invasion was by no means a bloodless one appears evident from the discovery at Krapina, where the fractured bones of both races were found lying side by side. It seems probable that the Aurignacian was not evolved from the Neandertal Race, either in Europe or elsewhere, and Klaatsch even goes so far as to say that "the development of the Aurignacian type from the Neandertal stock is, for various anatomical reasons, quite out of the question." There is, however, no concurrence of opinion among experts upon this problem at present. Kramberger and others hold that a gradual continuous evolution upwards took place, from *Homo heidelbergensis* at the bottom up to the existing European type. Another great authority, Schwalbe, considers that the Neandertal Race is a distinct one which does not fall within the limits of variation of normal humanity, of mankind proper, and that the establishment of a distinct species *Homo primigenius* in contradistinction to *Homo sapiens* is therefore justified, and he expressly states that the Neandertalers "stand in many respects nearer to the

highest apes than to Recent Man." He believes, however, that a certain skull found at Brüx in Moravia (a discovery, by the way, which has been largely lost sight of by recent writers) constitutes a connecting link between the two species, and such it appears to be both in form and in dimensions. Thus according to Schwalbe the development was in some such order as the following.

Neandertal. Spy. Krapina. Gibraltar.	*Homo primigenius.*
Brüx. Galley Hill. Brünn. Australian aboriginal. Modern European.	*Homo sapiens.*

Thus there is no lack of advocates for what may be called the Neandertal theory of the origin of existing mankind. I believe, however, that the other hypothesis is more likely to be the true one, and it cannot be gainsaid that it is strengthened by the discovery of *Eoanthropus.*

The Loesshunters stood about 5 ft. 4ins. high, and were therefore no taller than *Homo primigenius.* They were of a much lighter and more graceful build, however, and no doubt it was their superior agility and wits that enabled them to overcome the cumbrous strength of their brutish adversaries.

The question now arises: whence came these Aurignacians? It might be supposed, on the one hypothesis, that they were evolved from a Neandertaloid stock elsewhere than in Europe, developing

under favorable circumstances more rapidly than the Neandertalers in this continent, and then appearing upon the scene in late Pleistocene times in conflict with a people closely resembling their own direct ancestors. If, however, *Homo primigenius* be not the ancestor of *Homo sapiens*, the latter's origin must of course be looked for in some other direction.

In dealing with this problem it will be interesting to survey a theory put forth recently by Professor Klaatsch, whose conclusions are drawn from a variety of different observations and inferences. The reader must, however, be warned that it is essential to feel our way with great caution through the maze of difficulties which surround this question, and that the whole hypothesis here explained has been very severely criticized by competent authorities. However, the theory is an attempt, albeit a speculative one, to solve this fascinating riddle.

The essential ideas are set out in the plan. (Fig. 51.) It will be seen that a great multitude of propithecanthropi* (i.e., pre-ape-men—or common progenitors of apes and men) is supposed to have existed in the remote past on some continent, whose position is still quite hypothetical. This assemblage broke up into mighty hordes, which swarmed away in all directions. In the "proportions of the different parts of their bodies and in the character of their teeth, these propithecanthropi resembled human beings, not the anthropoid apes.† They were, however, still pre-men, 'proanthropi,' since their foot had not yet undergone the definite change from a grasping

*Pithecos=Ape. Anthropos=Man.

† The man-like apes include the Asiatic species, the orang-utan and the gibbons, and the African species, the gorilla and the chimpanzee. The great order of mammals called the Primates includes the lemurs, monkeys, apes, and mankind.

organ to a supporting apparatus. Of their general appearance we know nothing, but in the possession of hair and other features it may be supposed that the apes have retained the primitive condition" (Klaatsch).

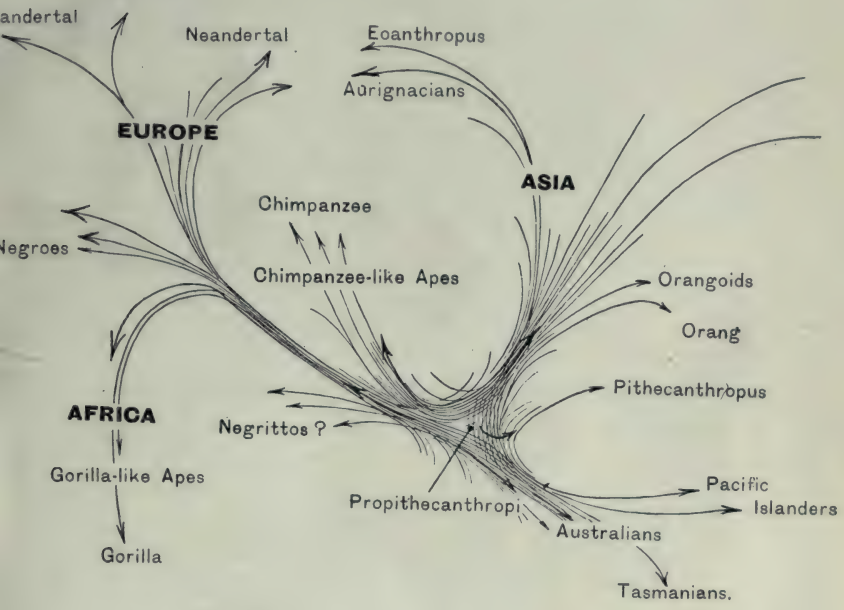


Fig. 51.—Plan of the origin and dispersal of human races and apes according to Klaatsch's theory, with the addition of *Eoanthropus*.

The gibbons and the mongoloid races of mankind are not shown. The "gorilla-like apes," "chimpanzee-like apes," and "orangoids" are hypothetical ancestors of the gorilla, chimpanzee, and orang-utan respectively,—creatures intermediate between the propithecanthropi and those apes.

From the great concourse of pre-men, one huge horde poured away in the direction of Africa, some of its members pursuing their wanderings through generations until they eventually reached Europe across the bridge of land that then united the two continents—being accompanied in their migration by

the Preglacial fauna, the *Elephas antiquus*, *Rhinoceros mercki*, etc. These were the ancestors of the Neandertal race. From the same horde the ancestors of the Pygmy Negroes, or Negrittoes, diverged very early, and later on the forerunners of the true negroes, of the gorilla-like apes and of the gorilla separated from the main stream. It is supposed that the forerunners of the Neandertalers and of the gorilla evolved for so far together, because their respective skeletons have so many points in common.* Another smaller stream of pre-men wandered south and became the Australian aborigines; the ancestors of these natives must have branched off very early, for the Australians possess certain very primitive and peculiar anatomical characteristics. Yet another horde departed from the motherland and made its way into Asia, and from these pre-men the orangs are supposed to have originated, whilst the main horde, ever evolving, continued its way westwards and eventually arrived in Europe along with the Glacial fauna—the mammoth, the *Rhinoceros tichorhinus*,† etc.—and became the Aurignacian race, which there met with the Neandertalers, whom it forthwith exterminated in this continent. The precursors of the Aurignacians and of the orang are supposed to have progressed some distance together owing to the resemblance between their skeletons. Klaatsch did not know of the new discovery at Piltdown when he drew up his scheme. But whether or not *Eoanthropus* was the direct ancestor of the

* A very interesting point in Klaatsch's scheme in the above form is that it not only implies an extremely remote divergence between Aurignacians and Neandertalers, but also between the still existing varieties of mankind, the negroes being classed with the Neandertalers, not with ourselves.

† The *Rhinoceros tichorhinus* (=*antiquitatis*) has been known as the "Woolly Rhinoceros" because it is constantly associated with the mammoth, which had thick wool, and was, like the mammoth, an inhabitant of the icy tundras, and hence (it was assumed) must have been similarly clothed. But a specimen with the soft parts well preserved was recently discovered, and it is totally devoid of fur!!

Aurignacians, that creature would have to be regarded, on Klaatsch's theory, as a branch of the same stem which gave rise to the orang and *Homo sapiens*. The chimpanzee separated off from the original stock very early, but has retained a large number of primitive characters,—particularly in its teeth,—and hence is nearer to mankind (because nearer to the propithecanthropi) than any of the other manlike apes. The Javan ape-man and the gibbons also separated off early, becoming somewhat isolated from the remaining multitudes. The gibbons and the *Pithecanthropus* have some characters in common.

It has of course never been believed in scientific circles that men are descended from apes, but only from a common ancestor with them, although the contrary has often been stated by the opponents of evolution. Such misunderstandings are well dealt with by Klaatsch in the following words:—"Such a misconception is best corrected by stating that the apes are to be regarded as the results of unsuccessful attempts to compass the road to mankind, as degenerate branches of the pre-human stock, which in adapting themselves to special conditions of life in the struggle for existence sacrificed important parts of their anatomy, the way upward being cut off in particular by the reduction of the thumb. Whilst this was happening, a more favored branch of the primeval stem was quietly evolving upward into mankind, retaining in the process many of the primitive characters."

This conception may be crudely summarized in the statement:—Man is not descended from the ape, but the ape from man. It would be well, however, to take the theory *cum grano salis*.

Fig. 52.—Skull of a mature gorilla.

Fig. 53.—Skull of a baby gorilla. Fig. 54.—Skull of a mature man. (From Leche).

If it be true that the apes are descended in the manner explained from creatures which were nearly human, we shall expect to find that the young apes

are more manlike than the adult individuals, since it is well known to zoologists that the individual in its development always tends to recapitulate the evolution of the race to which it belongs, thus passing through ancestral phases. One instance of this must suffice. The fœtus of all mammals possesses at one period of its development slits in its throat, like the gill-slits of fishes, and mammals are of course to be regarded (for countless other reasons) as descended from fishes. In this connexion therefore Figs. 52 to 54 are highly significant, the man-like form of the young gorilla's skull being at once apparent.

It is not unreasonable to hope that the remains of the common ancestor may one day be discovered, and indeed a small creature has already been found which is probably not far off the main line of descent. This is the fossil monkey, *Propliopithecus*, which has already been mentioned. It was discovered in the Oligocene of Egypt, and it is described as having an almost human dentition, the canines being weakly developed and the incisors (front teeth) and the premolars being perpendicular in position. The discoverer believes that this genus "... the ancestor not only of all the Simiidæ" (true apes) "but also of all the Hominidæ" (the man-family). It seems unlikely that the hypothetical pre-ape-men were in existence as early as the Oligocene, but this dwarfish *Propliopithecus* certainly appears to possess the characters that we should expect to find in a more distant common ancestor.

When the two types met in Europe it is quite likely that a certain amount of racial intermixture took place and such may have been the origin of the Grimaldi people, and even (according to some authorities) of the Cro-Magnards.

CHAPTER VII.

THE CLOSE OF THE ICE AGE.

THE last phases of the Glacial Period are remarkable for the wonderful works of art which were then produced by the cave-men. All the chief representatives of the Late Pleistocene fauna, mammoths, bisons, goats, reindeer, horses, and others, are known to us not only from their bony remains, but from the carvings in bone and ivory that have been left in caverns by the romantic savages who hunted these animals. And in addition to the carvings, many graphic drawings and paintings were executed upon the walls of the caves which served as places of refuge for the hunters. Most of these carvings and paintings are attributed to the Cro-Magnon Race, but the Aurignacians were undoubtedly responsible for some of them.

It is in the Valley of the Vézère, in the Dordogne, France, that most of the wall-paintings have been discovered. The wall-pictures were at first rejected as forgeries, or as modern scrawlings, but now-a-days no competent critic doubts either the genuineness or the antiquity of these extraordinary productions. Although the pictures have now been known for years, one can never cease to marvel at the perfection of skill possessed by the prehistoric artists. As long ago as 1875, wall-paintings were discovered in the famous rock-shelter "La Madeleine," the cave which gives its name to the last

stage of Pleistocene culture, the Magdalenian (see Table III.)

The most ancient engravings upon the walls of caverns were not found here, however, but in the Grotte Pair-non-Pair, in the Gironde, and in the Grotte de la Grèze. These consist of the bare outline of chamois and bisons, engraved upon the walls by means of stone-knives; they antedate the Magdalenian epoch and must be attributed to the Loess-hunters,—far back in the Aurignacian epoch.

Fig. 55.—Painting of a bison in black and brown colors on the wall of a cavern at Altamira, in Spain.
(After the Abbé Breuil from Verworn.)

Remarkable drawings and paintings were discovered as early as 1880 in a cavern near Altamira, in Spain. These are of Magdalenian date, and consist once more of pictures of animals, and are found not only on the walls of the cave, but on its ceiling. The picture on the ceiling represents a group of different animals—bisons, horses, asses, wild boars, red-deer—drawn on a very large scale.

the whole covering an area of no less than 145 sq. feet. Thus we find some of the chief members of the Magdalenian fauna grouped together. Some of the animals are merely engraved in outline, but others were painted in black or in brownish red. A painting from this cavern is shown in Fig. 55, and the talent displayed is again extraordinary.

A large number of similar discoveries have been made during the last thirty or forty years in the Dordogne caverns (in La Mouthe in 1895, in Combarelles in 1901, etc.) and also in other caves in Spain.

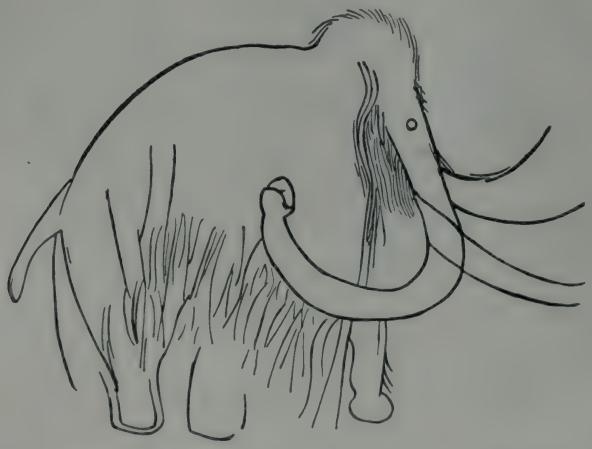


Fig. 56.—Mammoth. Drawing on the wall of the cave *Combarelles*,— about 1/9 the actual size.

(After Capitan and Breuil from Verworn.)

"Combarelles" is an extremely long and very narrow cave. Its width varies from 3 to 7 feet, and its height from about 4 to 6 feet, but it is no less than 260 yards long. In places the roof is so low that one can only just crawl along. The wall-pictures, 109 in number, begin about 130 yards from the mouth of

the cave, and cover an area of over 2,000 sq. feet on the two walls. Many of the figures were covered by a thick layer of calcareous sinter. One of the most interesting drawings is that of the mammoth shown in Fig. 56.

It is not easy to imagine how the prehistoric artists were able to see sufficiently well in the caves to accomplish their tasks. For the drawings are often several yards long, and frequently intersect each other in a manner that must have been very confusing. It must be supposed that the work was carried out for the most part by the flare of smoky fires, but it is certainly remarkable that under such circumstances the outline of the creatures should be so true to nature. In some cases the caves seem to have been lighted in addition by small lamps, such as the specimen shown in Fig. 57, which was buried deep in calcareous sinter in the cave called La Mouthe, in the Dordogne. The lamp is made of red sandstone and has the head of an ibex engraved upon its lower side.

Fig. 57.—Lamp made of red sandstone. From the cave *La Mouthe*, in the Dordogne.

Another cave in the Dordogne, known as "Font de Gaume," is also famous for the paleolithic pictures that have been found in it. The artistic achievements surpass even those of Combarelles, all the figures being either partly or wholly colored. Ochre-earth and manganese-black were used as paints. Up to the present, pictures of 49 bisons, 4

reindeer, 4 horses, 2 mammoths, and 3 antelopes have been recognized in this cavern. The two reindeer, occupied in browsing, shown in Fig. 58 are perhaps the finest pictures from this cavern, and they are scarcely excelled by any other productions of paleolithic art. As will be seen, they are only partly colored. The reindeer was apparently the most abundant animal during this last phase of the Pleistocene, and the Magdalenian Age is therefore sometimes known as the "Reindeer Period" and the Cro-Magnon Race as the "Reindeer-hunters."

Fig. 58.—Picture of two reindeer on the wall of the cave *Font de Gaume*, near Les Eyzies, in the Dordogne. The animals are apparently browsing.

(After Capitan from Verworn.)

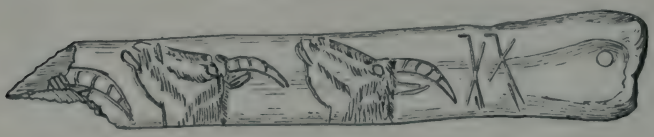
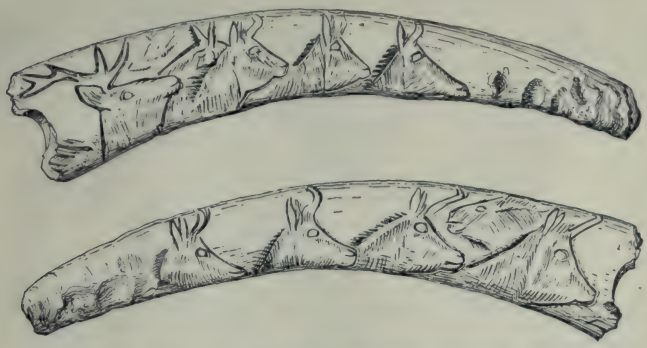


Fig. 59.—Goats' heads engraved on bone from the cave *Maz d'Azil*, (Pyrenees). $\frac{2}{3}$ the actual size.

(After Breuil.)

The Cro-Magnon peoples, like their forerunners the Grimaldi Race, frequently carved the heads or

figures of animals in ivory, bone, and horn. Some typical representatives of their workmanship are shown in Figs. 59 to 62.



Figs. 60 and 61.—Heads of antelopes engraved on pieces of bone; from the cave at Gourdan (Garonne). ⅔ the actual size.
(After Piette from Verworn.)

Fig. 62.—Engraving on a piece of bone, found in the cave *La Madeleine*. The man is carrying a staff or javelin, and two horses' heads and a snake (?) are also shown. Scale ⅔ the actual size.
(After Lartet and Christy from Reinhardt.)

Another excellent carving is that on the dagger (Fig. 63) made of reindeer-horn, the handle of the weapon being cut into the form of a reindeer's body. Similar daggers with handles carved to represent other animals, and in one case a human being, have been found in various localities.

Fig. 63.—Dagger composed of reindeer-horn from the cave *Laugerie Basse* in the Dordogne. Scale $\frac{1}{3}$ the actual size.
(After Lartet and Christy.)

It seems probable that during the warmer seasons of the year the hunters of the reindeer and mammoth lived in tents. Strange little structures are

crudely represented on the bodies of horses, mammoths, and bisons in Combarelles and Font de Gaume; these are shown in Figs. 64 and 65. There seems no doubt that they are tents; the supporting poles were probably covered by the hides of various animals, after the manner of tent-construction still in vogue among Eskimos and Red Indians.

Fig. 64.

Fig. 65.

Figs. 64—65. Tents engraved upon a picture of a bison in the cave *Font de Gaume*. In Fig. 64 the escape of smoke appears to be shown, and in Fig. 65 the entrance to the tent is illustrated. (After Capitan.)

Before leaving this artistic epoch in the story of man, I must refer to some odd-looking pictures, (Fig. 66) which when first discovered were a great puzzle. According to Verworn and other authorities these curious "animal-men" are hunters who have

Fig. 66.—Paleolithic engraving on bone from the cave *Abri de Mège*, in the Dordogne. The hunters are disguised as chamois. (After Capitan, Breuil, Bourrinet, and Peyrony.)

dressed themselves in chamois-skins, in order the better to stalk some quarry in the long jungle-grass. The Bushmen of South Africa also draw hunters dressed up as animals in a similar manner, and some of their pictures are shown in Figs. 67, 68 and 69; these

Fig. 67.

Fig. 68.

Fig. 69.

Figs. 67, 68 and 69.—Drawings by the Bushmen of South Africa, also showing men disguised as animals.

(Figs. 67 and 69 after Orpen; Fig. 68 after Péringuey. From Verworn).

drawings certainly tend to confirm this explanation of the Pleistocene pictures. The Bushman Race is an extremely lowly one, and thus in this case, as with the Pleistocene cave-dwellers, we are impressed with the fact that high artistic talent and

a total absence of civilization can go hand in hand.* The same phenomenon meets us with the Eskimos and Australian aborigines, who are primitive savages possessed of considerable æsthetic taste.

In concluding the account of the Magdalenian culture, we leave behind us the Glacial Period, and the whole Paleolithic stage of human progress, at least so far as Europe is concerned, and pass on into the present phase of the Earth's history, which is known to geologists as the "Recent Period." I do not propose to deal in any detail with these late stages in the story of prehistoric man; they fall more within the purview of archeology than into that of geology and physical anthropology; but I shall give here a brief summary of the epoch in order to connect up in the mind of the reader the great Paleolithic Period with the commencement of written records. Progress in Post-glacial times was rapid; we pass immediately into the era of pottery-making, and before very long the use of metals became known.

Now the glaciers of the last, the so-called Würm, Ice Age did not retreat in a steady uninterrupted manner, but with halts that can be clearly recognized. These stages in the recession have been named respectively the Bühl-stage, the Gschnitz-stage, and the Daun-stage by Penck and Brückner, and their scheme harmonizes well with Geikie's researches. The movements of the ice and the consequent geographical changes can be clearly perceived, because the traces of the last glacial phase have of course never been obliterated or disturbed

* The South African rock-paintings are ascribed to the Bushmen, although there exists no positive proof that this is correct. It is, however, difficult to conceive by whom else the pictures could have been painted.

by any succeeding advance of the ice-sheet. And it is possible to infer from these undisturbed deposits the length of time that has elapsed since the termination of the Pleistocene, the estimates in this case being fairly reliable. On a moderate computation it is about 20,000 years since the beginning of the Neolithic Period in Europe. The reader will understand, however, that there was no sudden geological break between the Pleistocene and Recent Periods; the former passed gradually into the latter.

It appears that at the end of the Glacial Period many if not all of the settlements of the paleolithic hunters were deserted by their older occupants. Above the strata in which paleolithic implements are found, there is usually a sterile layer, during the deposition of which the caves must be supposed to have been uninhabited.* In many parts of Europe this period during which the land was devoid of population was probably very long. But above the sterile layer we meet with the very superior stone implements of the Neolithic tribes, tools and weapons having a well-ground edge. And higher still, the perfectly polished Neolithic implements are to be found. But strange to relate the artistic productions which characterized the end of the Pleistocene, the carvings and the wall-pictures, are altogether missing. The artistic culture seems to have vanished from Europe with the retreat of the ice, and the few drawings which were executed in Neolithic times, in the Bronze Age, and even in the Iron Age are utterly crude and unskilful. This is a mystery which has not yet been satisfactorily dispelled.

* It is not quite certain when the Neolithic tribes first reached Britain, but probably before the final insulation of the country.

As we pass, too, from the Paleolithic to the Neolithic Period, we find that there has been a great revolution in the mode of life led by our ancestors; they had taken to agriculture, and in so doing they must have come to live a more settled, a less nomadic, existence. Even in the cavern Maz d'Azil (see Table III.), at the extreme end of the Paleolithic Period, little heaps of burnt wheat have been found, and along with the wheat there were the stones of sloe (*Prunus spinosa*), of plums, and of bird-cherries, and also the shells of nuts. The Azilian Age is to some extent intermediate between the Paleolithic and Neolithic Periods. The most ancient hand-mills for crushing and grinding corn are those found in Campigny, and elsewhere in France, in strata not much more recent than the Azilian. This old-time method of preparing meal has survived in other parts of the world even to the present day. Thus I came across hand-mills in the Valley of the Nile some years ago, which differed in no way from that illustrated here. (Fig. 70).

Fig. 70.—Rough hand-mill for grinding corn. Composed of sandstone. Neolithic. From the neighborhood of St. Quentin, in the North of France. Scale, $\frac{1}{6}$ the actual size. (From Reinhardt).

The Neolithic tribesmen began to build themselves small turf-covered huts, little hovels that were half-buried in the ground, like miniature artificial

caves. We find in these "pit-dwellings," as they are called, various primitive agricultural implements and sundry articles of a domestic nature. They often contain, for instance, crude and badly baked clay potsherds, the first examples of the potter's art. The shape of these potsherds underwent regular and characteristic changes from this time onwards; indeed, the changes are so constant and regular, that the shape of a potsherd is a reliable index of the age of the settlement in which it is found.

The peoples of the Later Stone Age understood how to domesticate the animals which lived around them. Certain outcast tribes wandered far north in early neolithic times, and inhabited the Baltic coasts of Denmark and of southern Sweden. They fed mainly upon shell-fish, and enormous heaps of refuse from their meals have been discovered along these coasts. The heaps have been given the name of "kitchen-middens." In the kitchen-middens the bones of the stag, roe-buck, wild-boar, wolf, fox, seal, and other animals have been found. And among the rest the bones of dogs have been identified, and these have sometimes been split open in order to obtain the marrow. It is evident, therefore, that the dog, the earliest friend of man, was used for food in these ancient days. Other animals, cattle and sheep, were domesticated by the more advanced neolithic peoples further south.

On the banks of lakes in Switzerland and elsewhere some of the prehistoric tribes began to erect their houses upon stout poles, building them right out in the water, the object doubtless being to make a hostile attack more difficult. These are the so-called "pile-dwellings," of which much has been written. Then metals came into use; first copper,

then bronze (an alloy of copper and tin), and finally iron. Iron was probably first imported into Europe from the East, since the metals were used much earlier in Asia than in our own continent. For instance, bronze was worked in Babylonia as early as 4,000 B.C. (Vide Table II.)

Most rapid progress in civilization took place during what is sometimes called the "Megalithic Age," that is, among the nations who erected the megaliths, great stone monuments, cromlechs and so forth, which are found along the coasts of the North Sea, the Atlantic, and the Mediterranean, and sometimes far inland.

Stonehenge is one of the most wonderful monuments of this kind; it dates from the Bronze Age. The megaliths carry us on to the beginning of historic times.

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